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NOTE: The opinions expressed by the various contributors to the JIPDEC Report do not necessarily reflect those views held by JIPDEC.

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JAPANESE SOFTWARE INDUSTRY

Shigeichi Mogi
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Japan's transition toward an advanced information society began around the latter half of the 1960's with the introduction of computers, and has continued at a remarkable pace throughout the 1970's up to today.

The information revolution up to and including the decade of the '70's focused primarily on the field of industry, with emphasis being placed on improving economic performance. Upon entering the '80's, however, informationization has branched out into all segments of society, penetrating all the way down to the individual level. In other words, the information revolution has expanded out from its base in industry to permeate into every nook and cranny of society.

GENERAL-PURPOSE COMPUTERS IN ACTUAL OPERATION

At present, Japan has the second most advanced information society in the world right after the United States in terms of numbers of general-purpose computers in operation. The number of computers actually operating in Japan as of the end of March, 1982, was 106

Table 1. General-Purpose Computers In Operation In Japan

(Amounts in 100 millions of yen)

	Units In Operation As Of End Of March, 1982	Growth Over The Same Period The Year Prior (%)	Value	Growth Over The Same Period The Year Prior (%)
Large-Scale Computers	3,500	8.6	26,781	9.7
Medium-Scale Computers	11,130	16.9	10,953	15.7
Small-Scale Computers	32,565	23.4	5,942	22.0
Very Small-Scale Computers	59,149	20.5	3,486	20.3
Total	106,344	20.5	47,164	13.2

(Note) Large-scale computers: Sales price – 250 million yen or more
Medium-scale computers: Sales price – 40 million yen or more
MITI Survey

Table 2. Number of Software Comapnies/Offices/Employees and Yearly Sales

	Number of Companies	Number of Business Offices	Number of Employees	Annual Sales (in millions of yen)
1975	1,015	1,276	57,164	275,090
1979	1,390	1,761	90,732	596,613
1980	1,343	1,731	93,271	669,844
1981	1,364	1,801	105,898	805,692
1982	–	1,864	113,414	911,907

(Source) MITI's "Survey On Special Service Industries"

thousand, valued at roughly 4,716.4 billion yen. This figure is expected to rise to 120 thousand units by the end of 1983.

Table 1 gives the actual figures for the number of general-purpose computers in operation in Japan as of the end of March, 1982, as well as their estimated values.

As these figures indicate, the total number of small- and very small-scale computers in operation as of the end of March, 1982, totalled 91,714 units, or roughly 86% of all the general-purpose computers in operation in Japan at that time. By value, the large- and medium-scale computers rank tops, but it is predicted that small- and very small-scale computers will occupy in excess of 90% of the market for general-purpose computers by volume in future.

INFORMATION PROCESSING INDUSTRY

1) Number of Companies in the IP Industry

The information processing industry in Japan has steadily grown in line with the increased utilization of computers here. First of all, let's take a look at how the number of companies in this industry, their sales and number of employees have increased recently. As Table 2 indicates, growth has been quite good in all these areas since 1975.

2) Breakdown of Personnel by Job Category

The types of jobs performed by the 105,898 personnel working in the field of information processing as of 1981 (Table 2) are shown in Table 3. As you can see, the greatest demand was for systems engineers and programmers, and the

Table 3. Number of Employees in the Information Processing Industry By Job Category

Job Category	Managers	12,377
	Researchers	2,701
	Systems Engineers	16,699
	Programmers	23,879
	Operators	12,379
	Key Punch Operators	23,666
	Others	14,197
	Total	105,898

percentage of jobs in these categories is expected to increase in future.

TODAY'S SOFTWARE INDUSTRY

1) Development Process

The first stage in the development process of Japan's software industry began in 1950 and extended through 1957. This period saw the origin of programming in Japan. The second development stage lasted from 1958 to 1967, and is referred to as the initial era of software creation. The period from 1968 to 1974 constitutes the third stage in the development of the Japanese software industry. It was during this time that Japan's software manufacturers improved on their respective programming skills. The fourth development stage, which has been characterized by the establishment of software development techniques, began in 1975 and has continued to present. The software industry is expected to continue to grow in future, first establishing a solid business base for itself, and then promoting its technological base. The latter will involve the development of software productivity enhancing techniques and advanced information technology, the establishment of R&D systems and the utilization of public data communications circuits, plus the distribution of general-purpose software and the development of leading-edge technologies.

2) A Relatively New Industry

As Table 4 indicates, the Japanese software industry is still a relatively new industry, the first software companies having been founded less than 30 years ago. Approximately 70% of all of Japan's software houses were established between the years 1965 and 1975.

3) Sales Growth

The growth of sales in the software industry for the three year period beginning 1979 and ending 1981 is shown in Table 5. As you can see, compared to an average yearly sales growth of 17.7% in the information processing industry as a whole, the software industry recorded a high three-year average sales growth of 22.2%.

Of the sales recorded for the information processing industry in Table 2 of this report, those accounted for by software

Table 4. Growth of the Information Processing Industry

Years / Industry	1955~1964	1965~69	1970~74	1975~present	Total
Software Industry	11	44	96	55	206
Information Processing Service Industry	22	64	64	23	173
Total	33	108	160	78	379
Percentage of Total	8.7	28.5	42.2	20.6	100

development and program preparation are as indicated in Table 6.

As these figures show, software development and program preparation are essential businesses for the software industry, the combined growth for which has averaged roughly 20% in recent years.

FUTURE VITALITY OF THE JAPANESE SOFTWARE INDUSTRY

Next we would like to present a summary of the results of a survey conducted by the Japan Software Industry Association (SIA) in March, 1982, concerning the "Vitality of the Software Industry and Its Visions for the Future." This survey targetted 196 software houses in Japan.

1) Yearly Sales Growth

The results of the SIA survey showed that sales in the Japanese software industry between 1978 and 1980 grew at an annual rate of 14.0%, with total sales during 1980 being approximately 1.3 times those for 1978 (Refer to Table 7).

Although the predictions for 1985 are somewhat modest by comparison with performance to date, still these figures indicate an increase in sales

Table 5. Ratio of Sales Growth in the Software Industry

Year / Industry	1978	1979	1980	1981	Three-Year Average
Information Processing Industry	–	18.0	17.1	18.1	17.7
Software Industry	–	24.5	20.9	21.2	22.2

(Source) Information-Technology Promotion Agency, Survey on the Operation of Information Service Companies

Table 6. Position of Software Development/Program Preparation In Overall Software Industry Sales

(Amounts in 100 millions of yen)

	Total Industry Sales	Growth Over Year Prior	Software Development/ Program Preparation Sales	Percentage Of Total Industry Sales	Growth Over The Year Prior
1979	5,966	29.6	1,747	29.3	–
1980	6,698	12.3	2,091	31.2	19.7
1981	8,057	20.3	2,275	28.2	8.8
1982	9,119	13.2	3,001	32.9	31.9
Three-Year Average Growth Rate (1980~82)	–	15.2	–	–	19.8

equivalent to 2.1 times those recorded during 1978, or an average annual growth rate of 11.5%, and a 1.6 increase in sales over those recorded for 1980, which works out to an average yearly growth in sales of 10.4%.

The expected increase in workers employed by software houses by 1985 is 1.4 times the number of employees recorded in 1978, an average annual increase of only 5.0%. Compared to predictions regarding sales growth, these figures are extremely low.

This factor can be attributed to information processing companies switching from a quantitative strategy aimed at increasing sales by means of augmenting their personnel, to a qualitative strategy, calling for additional high value-added services.

Table 7. Transition of Sales and Employees

Year / Item	Performance			Forecast
	1978	1979	1980	1985
Sales (In 100 millions of yen)	1,630	1,817	2,122	3,484
Employees	23,777	24,800	26,080	33,642

2) Sales By Type Of Business

Table 8 shows the transition of sales in the information processing industry by type of business for the three-year period from 1978 to 1980, and provides a forecast of how those sales are expected to look by 1985. The percentage of sales accounted for by the marketting of software products and provision of turn-key systems has steadily increased, prompting numerous companies to predict yet further growth of these businesses in future. The area of software development has also enjoyed steady growth of sales and is seen as accounting for a large 36.0% of overall sales by 1985. (The figure of 52.8% shown in Table 8 includes such work as the dispatching

Table 8. Sales by Type of Business

Year / Line of Business	1978 (%)	1979 (%)	1980 (%)	1985 (Estimated %)
*Software Development	47.1	45.4	47.9	36.0
Software Products Development and Sales	0.2	0.3	1.0	5.1
**Information Processing Services (Consignment basis)	37.0	37.2	35.1	29.4
Systems Development (including sale of turn-key systems and machinery/equipment	2.8	4.2	4.5	8.1
Others	12.9	12.9	11.5	4.6
Total	100	100	100	100

* Includes contract work, consultation and facilities management.
** Includes input/output and remote computing services.

of specialists to develop software products at the customers premises, called contract work.)

By comparison with the favorable growth predicted for the software development and software products businesses, sales for consigned processing, including input/output services, are seen as gradually declining.

The promotion of the software distribution business is particularly strong, and various measures, including the establishment of reserve funds for general-purpose software programs are being implemented. Software products are seen as vital goods for information service companies and the expansion of that market is being strongly advocated. However, the results of the survey being summarized here indicated that total sales for software products in 1980 only accounted for 1.0% of overall industry sales. Even though sales in this category are expected to jump to 5.1% of overall sales by 1985, it will still have a long way to go before it can be considered a true "bread & butter" business.

3) Percentage of Sales by Customer

Software development, i.e. the development of software on a consignment basis and the undertaking of related work accounts for a high percentage of overall sales in the software industry (47.9% as of 1980), and is a major source of revenues for information service companies.

If we look at the ratio of sales for custom software by type of customer, we see that the biggest customers in 1980 were ordinary companies, which accounted for a large 43.0% of sales in this category. The next biggest users of software development services were computer manufacturers, followed by firms in the information service industry, government agencies and public companies, in that order. Computer manufacturers represented 33.0% of overall sales in this category, information service companies another 11.1% and government agencies and public companies accounted for the remaining 9.5% of overall sales for software development.

Table 9. Percentage of Sales by Customer

Year / Type of Customer	Performance			Estimate
	1978 (%)	1979 (%)	1980 (%)	1985 (%)
Ordinary Companies	39.71	41.44	42.95	49.36
Gov't Agencies and Public Companies	10.65	9.60	9.50	9.27
Computer Manufacturers	33.79	33.68	32.98	29.57
Information Service Companies	13.23	12.58	11.11	8.04
Others	2.62	2.70	3.46	3.76
Total	100 %	100 %	100 %	100 %

Changes in the composition of these sales during the years between 1978 and 1980 weren't very big, but showed a tendency for the percentage accounted for by consignments from ordinary companies to rise, while those from computer manufacturers, information service companies, government agencies and publicly-operated companies dropped off slightly (See Table 9).

This same tendency is visible between the performance figures cited for 1980 and those predicting what sales in this category will be like in 1985.

Requests for software development from ordinary companies will rise, while those from computer manufacturers are seen as falling off a bit. This would seem to indicate a break away from the present state of reliance on computer manufacturers for software development jobs.

4) Sales by Type of Application

The applications for custom-designed software can be divided into five broad areas: the processing of office work, scientific and technical calculations, process control, basic software systems and software for microcomputers. Of these applications, the development of software for use in processing office work occupies the largest share by far, accounting for 63.0% of all custom software developed during 1980 (See Table 10). By comparison, software developed for use in process control applications occupied about 12.0% of sales during 1980, that for basic software systems roughly 8.4%, for scientific and technical calculations about 7.4% and for microcomputer applications just 6.3% of the total.

The forecast concerning the percentage of sales of custom-designed software by type of application for 1985 indicates that the share occupied by that for the processing of office work is expected to drop slightly, and a tendency for sales of custom-software for application in scientific and technical calculations, basic software systems and microcomputers, which require higher levels of technology,

Table 10. Percentage of Sales by Type of Application

Year / Type of Application	Performance			Estimate
	1978 (%)	1979 (%)	1980 (%)	1985 (%)
Processing of Office Work	66.33	64.51	63.04	52.90
Scientific and Technological Calculations	7.51	7.79	7.44	8.49
Process Control	10.67	10.87	12.04	12.99
Basic Software Systems	8.35	8.87	8.43	10.05
Software for Microcomputers	4.29	5.07	6.30	12.97
Others	2.85	2.89	2.75	2.60
Total	100 %	100 %	100 %	100 %

to rise. These predictions stem from the recent remarkable spread of microcomputers and microprocessors.

Overall, then, it would seem that more and more companies in the software industry are trying to move their custom software business away from applications such as the processing of office work where competition is more often than not based on price-cutting strategies, and to fields where the level of a company's technology determines its competitive power. This appears to be the thinking in small- and medium-sized companies especially, which are becoming less multi-vendor oriented and more specialized in their development of custom software.

5) Software Sales for Online and Batch Processing

The development of software for use in online and batch processing is another category of the software development business. Although the development of software for batch processing has been steadily declining year after year, its percentage of overall online/batch software sales is still high, working out to 64.7% in 1980 (See Table 11).

It is estimated that the percentage of software sales for online processing will increase by 1985, reaching upwards of 50%.

6) Demand in the Information Processing Industry in 1985

According to the results of the 1982 SIA survey, information processing industry sales in 1985 are expected to be 1.64 times what they were in 1980. Based on these results, if we calculate this predicted increase in sales by value using the 669.8 billion yen sales figure recorded for 1980 in the "Survey on Special Service Industries" (See Table 2) as our basis, then the expected increase in sales for 1985 will amount to a 1,098.5 billion yen market.

In terms of services, it is estimated that the software development and program preparation businesses will grow at an annual rate of 13.9%, creating a market for these services worth 395.5 billion yen by 1985. If this happens, these two businesses alone will account for 36% of overall sales in the information processing industry. Compared to the growth in sales predicted for custom software, that for facilities management is expected to be a rather low 9.8%, but is nevertheless seen as accounting for

Table 11. Percentage of Sales Related to Online/Batch Processing

Year / Online/Batch	Performance			Estimate
	1978 (%)	1979 (%)	1980 (%)	1985 (%)
Software for Online Processing	24.08	27.95	35.35	50.04
Software for Batch Processing	75.92	72.05	64.65	49.96
Total	100 %	100 %	100 %	100 %

around 107.7 billion yen worth of business in the 1985 Japanese information processing market.

That facet of the IP market expected to grow the most by 1985 is software products. Software products are predicted to grow at an annual rate of 52.9%, developing into a roughly 56.0 billion yen market by 1985. This kind of growth will be supported in part by the increased number of systems designs and developments expected to use software products in future.

The area of remote computing services is expected to grow at an annual rate of 28.7%. It is seen as developing along a two-pronged path, one involving software for use in communications networks, and the other the various data and software needed for data bank-type services.

Lastly are the turn-key systems which combine hardware and software. Turn-key systems have been growing at a yearly rate of 26.9% in line with the recent spread of office automation. By 1985, turn-key systems are expected to become a 48.3 billion yen market in Japan. Since the hardware manufacturers play such a big role in this field, software houses will have to work closely with them in future in order to realize the type of growth expected in this market.

JAPAN'S INFORMATION PROCESSING SERVICE INDUSTRY

Suguru Tsubokura
Secretary General
Japan Information Processing
Center Association

GROWTH AND DEVELOPMENT OF THE IP SERVICE INDUSTRY

1. Need For A Clearcut Definition

It is very important that a clear definition and classification of the information processing industry be established. The reasons for this are three-fold in nature. The first has to do with the fact that the definition of the information processing industry differs from country to country, making it extremely difficult to form any kind of international comparisons. Therefore, it is quite likely that Japan will propose that the information processing industry be properly classified and the various statistics pertaining to it be standardized on an international basis when the World Computing Services Industry Congress IV convenes in Tokyo in June of next year.

Secondly, even within Japan, the definition of the information processing industry isn't clearly understood. For this reason, numerous statistics gathered on the industry fail to accurately represent its actual status, despite the fact that considerable efforts are expended in trying to analyze the results of various surveys and studies.

And thirdly, due to this lack of a clearcut definition for the information processing industry here, even the articles which appear on the pages of this JIPDEC Report can be misleading, depending on the way the statistics used to support them are utilized.

Figure 1 shows the classification of the information processing industry used

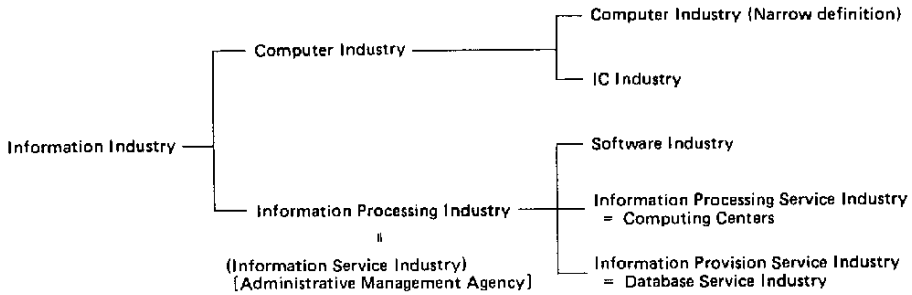

Fig. 1. Classification Of The Information Processing Industry

at JIPDEC, which is almost identical to the one utilized by the Information Industry Division of the Ministry of International Trade and Industry (MITI). The definition of the information processing industry put forth in this article conforms with those held by JIPDEC and MITI, which state that the IP industry is actually a combination of three separate industries: the information processing service industry, the software industry and the information provision service industry.

However, in the publication titled "Standard Industrial Categories In Japan," put out by the Administrative Management Agency, the information processing industry is defined as the "Information Service Industry." Also, even within MITI itself the definition of the IP industry differs according to which division of that ministry is involved. For example, in the "Survey Of Special Service Industries," put together by the Research & Statistics Division of MITI, the same term used by the Administrative Management Agency, that is, "Information Service Industry," is used to describe the information processing industry.

The information processing service industry also suffers from this sort of dual identity crisis, have been referred to as simply "Computing Centers" from early on in its existence. In addition, the information provision service industry has recently come to be called the "Database Service Industry."

2. Growth And Development Of The Information Processing Industry

The IP industry as defined herein has some 1,866 business locations, 113,400 employees and annual total revenues amounting to 911.9 billion yen. It is also estimated that there are roughly 1,300 companies in the information processing industry as a whole.

Table 1 of this article attempts to look at this industry by type of work performed. The figures given here coincide with those in "The Software Industry Today," in that they indicate the general trend in the information processing industry towards a gradual decrease in the percentage of business computing, a job which consists largely of processing business-related work on a consignment basis, accompanied by a steady rise in the amount of software development being performed. Another noteworthy point is the fact that information provision services (database services) still don't form a substantial part of the overall industry here in Japan.

For the past four years now, the information processing industry has continued to exhibit a high rate of growth compared to other Japanese industries, the size of its overall market having doubled during this period (See Table 1). Nevertheless, compared to the really big enterprises of the U.S. and elsewhere, the scale of the Japanese IP market is still rather small.

As is clear from a look at Table 2, only two Japanese companies in the information processing industry have

Table 1. Sales For The Information Processing Industry By Type Of Business

Year		Total	Processing Of Office Work	Other Types Of Consigned Processing	Software Development/Program Preparation	Card Punching
Actual Figures (In millions of yen)	1978	460,241 (100.0)	135,529 (29.4)	19,148 (4.2)	88,973 (19.3)	60,987 (13.3)
	1979	576,613 (100.0)	168,676 (28.3)	22,172 (3.7)	128,945 (29.3)	69,986 (11.7)
	1980	669,844 (100.0)	181,634 (27.1)	22,709 (3.4)	153,985 (31.2)	74,205 (11.1)
	1981	805,692 (100.0)	220,792 (27.3)	37,919 (4.7)	227,549 (28.3)	83,393 (10.4)
	1982	911,907 (100.0)	252,617 (27.7)	23,795 (2.6)	300,098 (32.9)	83,944 (9.2)

Year		Sale Of Machine Time	Facilities Management	Information Provision Services	Studies and Surveys	Others
Actual Figures (In millions of yen)	1978	12,007 (2.6)	66,521 (14.5)	27,069 (5.9)	31,540 (6.9)	18,466 (4.0)
	1979	14,911 (2.5)	90,616 (7.5)	31,604 (5.3)	39,319 (6.6)	30,384 (5.1)
	1980	15,345 (2.3)	104,103 (7.3)	44,059 (6.6)	38,676 (5.8)	35,128 (5.2)
	1981	14,173 (1.8)	71,806 (8.9)	60,737 (7.5)	48,228 (6.0)	41,096 (5.1)
	1982	11,252 (1.2)	88,495 (9.7)	52,342 (5.7)	52,187 (5.7)	47,177 (5.2)

Year		Total	Processing Of Office Work	Other Types Of Consigned Processing	Software Development/Program Preparation	Card Punching
Index (Based on 1978 figures)	1978	100.0	100.0	100.0	100.0	100.0
	1979	129.6	124.5	115.8	144.9	114.8
	1980	145.6	134.0	118.6	173.1	121.7
	1981	175.1	162.9	198.0	255.8	136.7
	1982	198.1	186.4	124.3	337.3	137.6
1982/1981 (%)		113.2	114.4	62.8	131.9	100.7

Year		Sale Of Machine Time	Facilities Management	Information Provision Services	Studies and Surveys	Others
Index (Based on 1978 figures)	1978	100.0	100.0	100.0	100.0	100.0
	1979	124.2	136.2	116.8	124.7	164.5
	1980	127.8	156.5	162.8	122.6	190.2
	1981	118.0	107.9	224.4	152.9	222.5
	1982	93.7	133.0	193.4	165.5	255.5
1982/1981 (%)		79.4	123.2	86.2	108.2	114.8

(Source) MITI's "Survey On Special Service Industries."

Table 2. Top 50 Information Processing Companies In Japan

Rank	Company Name	Fiscal 1982		
		Total Sales (Millions of yen)	Sales Per Individual (Ten thousands of yen)	Sales Growth Over Previous Year (%)
1	NEC Software, Ltd.	26,129	2,216	10.9
2	Nippon Business Consultation Co., Ltd.	22,987	1,371	14.5
3	Computer Service Co., Ltd.	17,712	565	23.5
4	Hitachi Software Engineering Co., Ltd.	14,829	706	27.5
5	Nomura Computer Systems Co., Ltd.	14,677	2,754	15.4
6	Japan Information Processing Service Co., Ltd.	14,648	1,355	18.1
7	Japan Information Service Co., Ltd.	13,935	1,452	34.1
8	Fujitsu FIP Co., Ltd.	13,575	1,209	43.0
9	Toyo Information System Co., Ltd.	13,023	1,470	35.0
10	Intec Inc.	12,361	1,039	17.5
11	Quotations Information Center K.K.	12,813	6,101	—
12	NEC Information Service, Ltd.	10,752	1,955	12.8
13	Century Research Center Co., Ltd.	10,255	1,163	16.0
14	Japan Business Automation Co., Ltd.	9,346	1,923	11.6
15	Kyoei Information Processing Service Center	8,851	1,125	8.3
16	Central Systems Co., Ltd.	7,974	1,199	13.9
17	TKC Co., Ltd.	7,128	3,198	9.3
18	Daiko Electronic & Communication Co., Ltd.	7,040	1,709	12.4
19	Mitsui Knowledge Industry Co., Ltd.	6,710	2,275	10.7
20	Nippon Electric Development Co., Ltd.	6,572	1,027	—
21	Marketing Intelligence Corp.	6,433	969	17.3
22	Diamond Computer Service Co., Ltd.	6,168	2,345	23.8
23	The Nikko Computer Systems Co., Ltd.	5,737	2,732	—
24	Computer Engineers Co., Ltd.	5,725	910	15.1
25	Nippon Time Share Co., Ltd.	5,719	974	34.3
26	Nippon System Development Co., Ltd.	5,164	951	13.7
27	Fujigin Computer Service, Ltd.	5,047	971	13.3
28	Nippon Computer Service Center	4,212	366	38.7
29	Software Research Associates Inc.	4,200	1,050	23.6
30	Nippon Information Industry Co.	4,200	522	16.7
31	Seibu Information Center	4,177	1,114	16.2
32	Kansai Electronic Computing Center	4,136	1,538	46.7
33	MSK Systems Co., Ltd.	4,126	4,168	13.3
34	Nippon Computer Systems Co., Ltd.	3,891	748	7.7
35	Compuer Applications Co., Ltd.	3,860	1,170	20.9

Rank	Company Name	Fiscal 1982		
		Total Sales (Millions of yen)	Sales Per Individual (Ten thousands of yen)	Sales Growth Over Previous Year (%)
36	Data Process Consultant Co., Ltd.	3,856	387	5.9
37	Tokyo Stock Exchange IP Center	3,487	2,165	0.5
38	Fuyoh Data Processing & Systems Development Ltd.	3,371	812	10.3
39	Asahi Business Consultant Co., Ltd.	3,345	597	25.5
40	Chuo Computer	3,132	360	22.6
41	Nissei Computer Service Co., Ltd.	3,127	633	△ 3.3
42	Nippon Information Research Center Co.	3,077	594	0.1
43	Yamato System Development Co., Ltd.	3,074	801	35.8
44	Kobe Computer Service Co., Ltd.	3,044	1,347	12.4
45	Ryobi Systems Co., Ltd.	2,947	615	22.7
46	Hokkaido Business Automation Co.	2,914	985	△ 4.4
47	Basic Software Corp.	2,903	764	29.5
48	Ryoyu Computing Co., Ltd.	2,687	393	18.7
49	Densan (DSN)	2,686	845	2.4
50	Nippon Traffic Computer Center	2,654	1,106	△17.8

Taken from the November, 1983 issue of "COMPUTOPIA"

achieved yearly sales of more than 20 billion yen, these being NEC Software Ltd. and Nippon Business Consultation Co., Ltd. The former is a software company affiliated with Nippon Electric Co., Ltd. (NEC), a major Japanese computer manufacturer, and the latter is an integrated information service vendor affiliated with Hitachi, Ltd., also a leading Japanese computer manufacturer.

There are 11 Japanese IP companies in the 10 billion yen or more per year sales bracket. The number three company by sales is called Computer Services Co., Ltd., a firm which devotes roughly 2/3 of its operations to the development of software and the remaining 3/1 of its business to facilities management. Hitachi Software Engineering Co., Ltd., the company in the number four position, is 100% software development oriented. Quotations Information Center K. K. (QUICK) is the only company in Japan that has the provision of information as its sole business. With the exception of these three firms, the other 10 billion yen or better companies in the Japanese information processing industry all offer comprehensive, integrated information services and have nationwide online computer networks to provide their customers with a variety of information processing services.

NEC Software and Hitachi Software Engineering are two examples of software houses affiliated with major Japanese computer manufacturers which have grown remarkably fast in recent years.

Companies such as Nippon Electric Development Co., Ltd. (ranked 20th), Nippon Time Share Co., Ltd. (25th), Software Research Associates Inc. (29th) and Computer Applications Co., Ltd. (35th) are all leading software houses which have made it on their own.

Figure 2 is included here to indicate the transition in sales of the top 16 IP firms in Japan during the past 10 years.

3. Where Is The IP Industry Heading ?

Three types of companies comprise the information processing service industry here in Japan.

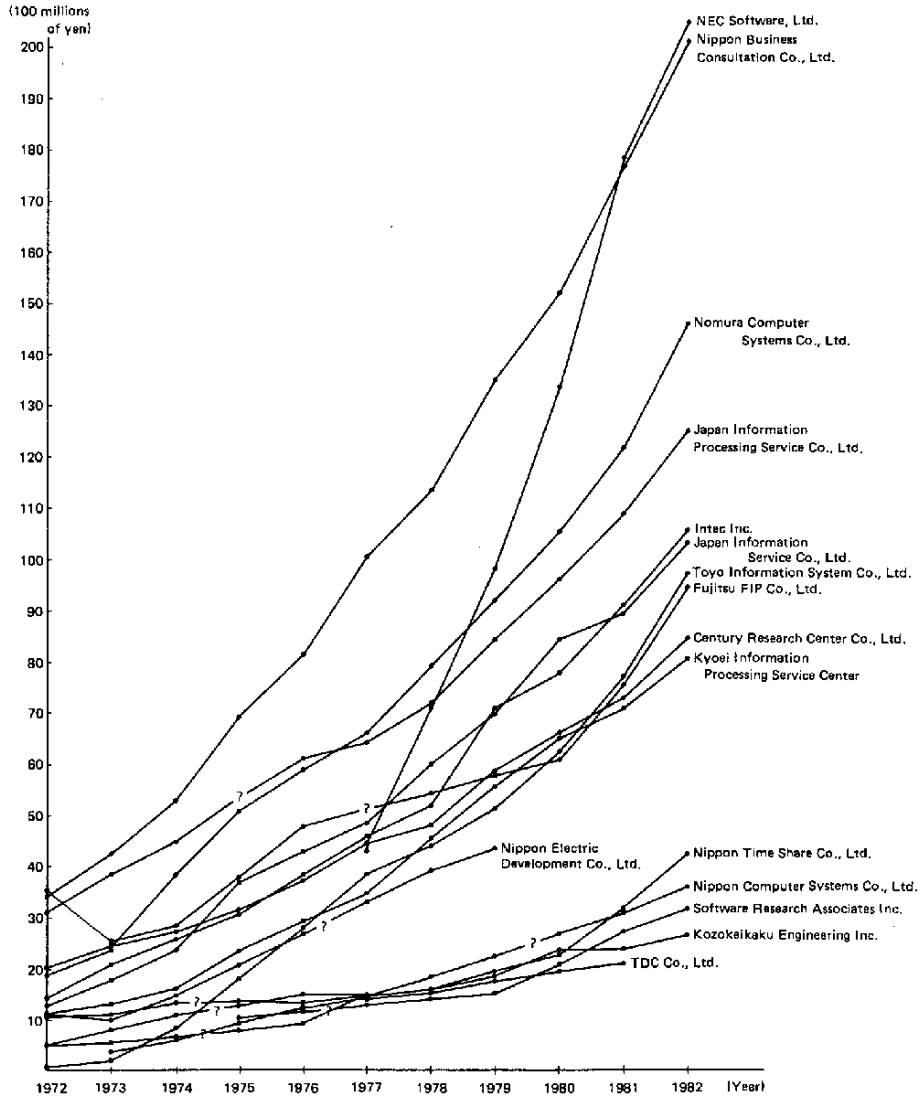

Fig. 2. Sales Of Major Japanese Information Processing Firms

The first type consists of a number of companies which provide a variety of integrated information processing services using their own nationwide networks. These firms all fall into the 10 billion yen and over annual sales bracket. At present, they are either planning or have already begun to offer value-added network (VAN) services.

The second type of company making up the Japanese information processing service industry operates out of major cities in the outlying regions of Japan and services local municipal governments for the most part. There is approximately one such firm per every prefecture in Japan and they generally earn annual revenues of less than 10 billion yen. However, the growth rate of computing and other information processing services aimed at municipal governments has slowed and demand for such services from private firms in outlying cities is slight. Competition from the network-based services provided by those firms that fall into the Type 1 category has also been increasing. All these factors combined have resulted in slow growth for this type of company during the past few years. As a result, most of them have turned to supplementing their business with the sale of small-sized computers and office automation equipment.

The third type of company in the IP service industry is the small- to medium-sized firms so numerous in the major metropolitan areas of Japan, such as Tokyo and Osaka. The sudden widespread utilization of easy-to-use information processing equipment like office and personal computers, however, has put a damper on computing services aimed at the ordinary business. Increasing numbers of companies which fall into this category have thus been placing more weight on software development and the development and sale of turnkey systems.

It probably won't be long before those companies described herein as Type 2 and Type 3 information processing service firms begin to enter into business tieups with the big Type 1 companies so as to take advantage of the latters nationwide network systems.

A few quick calculations based on the figures provided in Table 2 show that total fiscal 1982 sales for the top ten information processing service firms in Japan amounted to 163.8 billion yen. This works out to roughly 18% of the overall IP market (911.9 billion yen divided by 1,300 companies). The share of the information processing services market in Japan held by the major companies in this industry has steadily grown during the past several years, a trend which promises to accelerate considerably in future.

Software firms receive approximately 30% of their work from computer manufacturers and about another 40% from ordinary private businesses. The majority of this work consists of orders from these customers for custom-made software. This situation has suppressed demand for packaged software (software products). The percentage of overall sales accounted for by packaged software products even at the traditionally big

software houses such as Japan Time share, Software Research Associates and Computer Applications is still quite small.

Database services have also been slow getting off the mark in Japan. In fact, as mentioned previously, the only real honest-to-goodness database service company in Japan at this time is Quotation Information Center K. K. (QUICK), which is ranked 11th in the overall standings. Other companies which also provide database services as part of their business operations include Japan Information Processing Service Co., Ltd. (ranked 6th), Japan Information Service Co., Ltd. (7th), Fujitsu FACOM Information Processing Co., Ltd. (8th), Toyo Information System Co., Ltd. (9th) and Intec Inc. (10th), but this service only accounts for a small percentage of these companies' overall sales.

RECENT 'HAPPENINGS' IN THE IP SERVICE INDUSTRY

1. Promotion Of Security Measures

The most interesting and noteworthy of recent 'happenings' in the Japanese information processing service industry are the measures which have been adopted in line with security issues.

Security is quite naturally a very important part of the information processing service industry, an industry which makes a business out of handling other peoples information.

In 1976, MITI published a set of guidelines for computer users titled, "Security Standards For Computer Systems." Then, in 1981, it inaugurated a "Certification System For Security Measures Implemented At The Place Of Business," a system aimed solely at the information processing service industry. MITI also layed down a set of "Certification Standards" at this time.

These certification standards cover two broad areas, one dealing with "Facilities Standards," which stipulate criteria for computer room facilities as well as the buildings in which they are housed, and the other with "Operation Standards," which set forth criteria for computer operation and the training required of information processing personnel. These certification standards are quite detailed, covering nearly 300 items in all.

Information processing service vendors who wish to be certified by MITI must be capable of meeting all the criteria set forth in these standards. To do so, they must first undergo an equipment and facilities inspection conducted by a special agency appointed by MITI. If they pass this inspection, they must then submit to an inspection of their operations by a team from one of MITI's eight bureau offices nationwide.

If the vendors pass this inspection, they are then examined by a special MITI Security Committee, and if the results of that examination are positive, they receive a written certification from the Minister of International Trade and Industry.

These certification standards are extremely tough, meaning that vendors wishing to be certified have to make

special security-related investments which can run anywhere from tens to hundreds of millions of yen. For this reason, only 38 information processing service locations throughout Japan have been certified by MITI during the past year. But quite a few vendors are in the process of constructing their own buildings and facilities to meet with the strict MITI standards, so that this number should increase in future.

This certification system isn't based on law, only on MITI's powers of administrative guidance. Nevertheless, it's doubtful whether there is a stricter system to be found anywhere in the world.

2. Liberalization Of Communications Lines And VAN Services

As computer utilization becomes more advanced, it only stands to reason that the utilization of public communications lines will become increasingly important. However, in Japan the use of public circuits for data communications purposes has been very tightly regulated up to now. Numerous groups involved in computer utilization have thus been demanding the liberalization of regulations governing the use of these circuits.

These demands have been voiced by information processing service companies in particular due to the fact that it is practically impossible for them to utilize public circuits to provide data communications service to their customers since this type of utilization is being monopolized by the Nippon Telegraph and Telephone Public Corporation (NTT), which owns and maintains Japan's public communications lines.

In response to strong demands for the liberalization of NTT's data communications circuits on the part of this industry, the Ministry of Posts and Telecommunications (MPT) finally began looking into the problem about two years ago. However, there was a clash of views regarding how these lines should be utilized, with MPT on the one side stating that utilization should continue to be strictly regulated for financial and technical reasons, and MITI and the IP industry on the other side claiming that the need for freer utilization of public communication lines must be recognized. In October, 1982, this struggle finally brought about a partial liberalization of NTT's data communications circuits.

In spite of this liberalization, however, compared to ordinary computer users, the information processing service vendor is still being restricted in its use of public communications lines, and can provide VAN services only to small- and medium-sized firms in most cases.

But why have VAN services been approved even in the case of small- and medium-sized companies? Well, this came about as a result of MITI's claim that if all VAN services were ruled out, then a big gap in computer utilization would manifest itself between large companies, which can afford to install their own computers, and the small- and medium-sized companies which are not in a position to do so. A group of politicians, which makes it a practice to support the small- and medium-sized

businesses in Japan, saw the wisdom in MITI's words and took up the struggle for liberalization of public data communications lines so that VAN services could be made available to the smaller companies.

This state of affairs may seem a little strange to the foreign reader, but at any rate, it has resulted in the availability of VAN services here in Japan, at least on a partial basis. Such firms as Intec, Japan Information Service and Fujitsu FIP have already initiated VAN services, and the big integrated information service vendors like Nomura Computer Systems, Toyo Information System and NEC Information Service, Ltd. are planning to start such services in the near future.

However, large transportation companies and supermarkets, which already have their own nationwide computer networks in place, have been announcing their plans to enter this business with increasing regularity lately, a phenomenon which will probably persist for some time to come.

For these reasons, it is felt that there will more than likely be a genuine liberalization of public communications lines during 1984.

3. NTT'S Future Course

A national committee has been formed recently in Japan to tackle the enormous task of reorganizing the administrative structure of the government for the second time since the end of World War Two. One of the recommendations of this committee to date has called for the breaking up of NTT, Japan's public telegraph and telephone corporation which currently employs some 330 thousand individuals, into a number of smaller, private business concerns.

Just what will become of NTT in the near future is a matter of considerable interest to the information processing service industry. This is because NTT was able to use its influence as a public corporation to establish various data communications services ahead of private vendors starting as early as 1971. Although private information processing service vendors were able to initiate similar services later on, the competition from NTT has been debilitating.

Another reason the fate of NTT is of such concern to the information processing service industry has to do with that corporation's plans to construct a nationwide advanced information system (the Information Network System [INS]) over the next ten years or so, requiring huge investments totalling more than 10 trillion yen. The successful construction of such a system is bound to have a tremendous impact on the future of the industry.

DATABASE SERVICES IN JAPAN

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DATABASE SERVICES CURRENTLY AVAILABLE IN JAPAN

1. Present Database Situation

As of September, 1982, there were a total of 456 different databases available in Japan; 604 if we include those that overlap with each other. Of the 456 original databases, 122 were constructed in Japan, and the remaining 334 by overseas producers.

Table 1 shows that the fields of business and natural sciences and technology account for 74% of all the databases currently available in Japan. As for the types of data contained in these databases, Table 2 indicates that textual data is the most numerous by far,

Table 1

Field	Number of Databases	Percentage
General	50	8
Natural Science & Technology	209	35
Social Science & Humanities	54	9
Business	234	39
Others	22	3
Data which overlaps two or more of the above content areas	35	6
Total	604	100

(Source) See Footnote 1

Table 2

Type of Data	Number of Databases	Percentage
Textual Data	391	65
Numerical	130	22
Image	2	(0.3)
Program Data	0	0
Data which overlaps two or more of the aobve types	81	13
Total	604	100

(Source) See Footnote 1

account for 65% of the total, followed by numerical data, which accounts for 22%. The category of textual data includes full text data as well. If we combine the amount of full text data with that of numerical and image data, we find that fact databases account for 33% of the total. In relation to this figure, document databases, which consist primarily of abstracts, account for 67% of the total number of databases available in Japan. Of the total number of databases available worldwide, numerical databases account for 59%, while document databases make up the remaining 41%. By contrast, however, here in Japan, document databases currently outnumber numerical databases. The reason for this is that the need for documentary data in Japan right now is greater than

Table 3

Database Services	Number of Databases
DB Producer	7
DB Distributor	166
Information Broker (Retailer)	22
Others	15
Services which include two or more of the above items	394
Total	604

(Source) See Footnote 1

that for factual data.

Table 3 shows the number of databases being provided by the various database service vendors. Database distributors offer the largest number of databases to the user. This can probably be attributed to the fact that the category of database distributors also includes those brokers which handle the larger number of foreign-produced databases.

2. Distribution Of Foreign-Produced Databases

Foreign-produced databases, which account for roughly 73% of all databases currently available in Japan, are distributed, i.e. accessible, domestically via the following three routes.

[1] Japanese DB Distributors

Japanese database distributors import foreign-produced databases and then provide users with access to this data using their own database management systems (DBMS). For example, the Japan Information Center of Science and Technology (JICST) provides CA Search and MEDLINE (biomedical bibliographies) to its users.

[2] International Public Communication Circuits

In September, 1980, Kokusai Denshin Denwa Co., Ltd. (KDD), Japan's public international telegraph and telephone company, established the International Computer Access Service (ICAS), which made it possible for Japanese users to access the information-rich databases of the United States. By April, 1982, ICAS had been expanded to include access to European databases as well, such as QUESTEL of France.

An international public data communications service called VENUS-P, which was designed to furnish foreign users with access to Japanese databases, was initiated in April, 1982, and by July, 1983, had absorbed ICAS, taking over the functions of that service as well. Today, VENUS-P provides users in fifteen major countries around the world with mutual access to each others' databases. Table 4 shows a representative sampling of the database services provided by VENUS-P.

[3] International Leased Lines

The Mark II network service (now called the Mark III) was first offered by Information Services International Dentsu, Ltd. back in 1973. Since then, a number of Japanese brokers have begun providing similar database services via international leased lines (See Table 5).

3. The Database Service Market

Revenues earned by the Japanese database service industry for the period

Table 4. Database Services Currently Available Through VENUS-P
(Circles [○] indicate services available via international leased lines)

Japanese Vendors	Foreign Supplier	Database	Country
Kinokuniya Co., Ltd.	○ DIALOG Information Services, Inc.	DIALOG	America
	CIS, Inc.	CIS	America
	Institute for Scientific Information	ISI/BIOMED ISI/COMPU Math ISI/ISTP & B	America America America
Maruzen Co., Ltd.	○ DIALOG Information Services, Inc.	DIALOG	America
	○ Toronto University	UTLAS	Canada
	Télésystéms-Questel	QUESTEL, DARC	France
System Development Corp. of Japan, Ltd. (SDC)	SDC Search Service	SEARCH SERVICE	America
	Derwent SDC		United Kingdom
Nihon Keizai Shimbun, Ltd.	The New York Times Information Services Inc.	THE INFORMATION BANK	America
	Data Resources, Inc. (DRI)	DRI-SEO	America
	Info Globe	Info Globe	Canada
Chemical Information Association	Chemical Abstracts Service	CAS ONLINE	America
Nomura Research Institute	Chase Econometrics/ Interactive	EXSTAT	America
	Data Corporation		America
Intec Inc.	I. P. Sharp	SHARP-APL	Canada
U.S. Asiatic Co. Japan Information Processing Service Co., Ltd. (JIP)	BRS, Inc.	BRS	America
Mitsui Knowledge Industry Co., Ltd.	Computer Sciences Corporation (CSC)	INFONET	America
SRI East-Asian Headquarters	SRI International	WP DATA	America

(Source) See Footnote 5

1978 through 1981 are as shown in Table 6. As you can see, sales suddenly rose in 1980, amounting to better than 44.2 billion yen, and jumped yet further in 1981 to reach 60.4 billion yen.

The database service industry in the U.S. achieved estimated sales of 10.4 billion dollars during 1980, while the European market is estimated to have earned revenues amounting to 6.6 billion dollars for that same one year period. Therefore, although growing, the Japanese market for database services is still only around 1/6 that of the U.S. market, and roughly 1/3 that of the European market.

Table 5. Services Currently Available Via International Leased Lines

Japanese Vendors	Foreign Supplier/Service	Database	Country
Information Services International Dentsu, Ltd.	General Electric Information Service Co./MARK-III	NRI/E	America
Quotations Information Center K. K. (QUICK)	Reuter/Video Mastor, Reuter Monitor (Int'l Network)	Money Rates Service	United Kingdom
Kyodo News Enterprize	Associated Press/Telerate (AP Telerate)	Telerate	America
Maruzen Co., Ltd.	DIALOG/MARUNET Toronto University/UTLAS	DIALOG UTLAS	America Canada
Kinokuniya Co., Ltd.	DIALOG/KINOCOSMONET	DIALOG	America
Control Data Japan, Ltd.	Control Data Corporation/ CYBERNET CALL/370 CALL/PLUS	TECHNOTEC COMPUSTAT	America

(Source) See Footnote 5

Table 6. Revenues Earned By Japan's Database Service Industry During The Five-Year Period From 1977 to 1981

(Amounts in millions of yen)

1977	1978	1979	1980	1981
29,930	27,154	31,620	44,210	60,427

(Source) Extracted from the Information Provision Services Industry portion of the 1981 MITI report on Special Service Industries.

Table 7. Classification Of Database Service Vendors

DB Producers	1
DB Distributors	9
Information Broker (Retailer)	2
Producer/Distributor	20
Producer/Distributor/Information Broker (Retailer)	6
Distributor/Information Broker (Retailer)	4

(Source) Prepared from data contained in the 1982 MITI Database Directory.

4. Database Service Vendors

The number of database service vendors in Japan is estimated at 42. According to a database directory compiled and maintained by the Ministry of International Trade and Industry (MITI), these vendors can be categorized as shown in Table 7.

It should be noted that database brokers are included in the category of distributors. Tables 8 and 9 provide examples of the leading database producers and distributors in Japan.

In December, 1979, those private firms among the database vendors mentioned above got together and formed the Database Service Vendor's Association. This association currently has 31 members representing a wide range of businesses (See Tables 10 & 11). It also speaks out on matters concerning database services, using such media as a bulletin it publishes itself, called simply, "Database." [1]

Table 8. Representative DB Producers In Japan *

(As of May, 1983)

Producer	Principal Database
Asahi Chemical Industry Co, Ltd.	ID-IR (Chemicals)
Asahi Shimbun Ltd.	National Resources (Population/Statistics)
Information Research Inc.	Technosearch (Newspaper/Magazine Articles)
Chemical Information Association	NQR
Kyodo News Enterprize	AP·DJ Telerate (Economics)
Keizai Bunken Kenkyukai	NEEDS-IR/JOINT (Newspaper/Magazine Articles)
Quotation Information Center	QUICK Video I, II (Quotations)
Jiji Press Ltd., Co.	Jiji Stock Prices (Securities)
Teikoku Data Bank, Ltd.	Cosmos 2
Tokyo Shoko Research, Ltd.	TSR (Company/Financial Data)
Toyo Medical Center	OMIC (Pharmaceutics)
Toyo Information System Co., Ltd.	BRANDY (Trademarks)
Japan Pharmaceutical Information Center (JAPIC)	JAPICDOC (Medicine/Pharmaceutics)
Japan Information Center of Science and Technology (JICST)	JICST Science & Technology Document DB (Science & Technology)

Note: Limited to commercial databases only.
(Source) See Footnote 5.

Table 9. Major Japanese DB Distributors

(As of May, 1983)

Distributor	Service System
Teikoku Data Bank, Ltd.	cosmos 2
Quotation Information Center K. K.	QUICK
Toyo Information System Co., Ltd.	JAPICDOC
System Development Corp. of Japan, Ltd.	SEARCH-J
Nihon Keizai Shimbun, Ltd.	NEEDS
JICST	JOIS-II
Nihon Shuppan Inc.	NIPS
Nippon Telegraph & Telephone Public Corp.	DEMOS-E
Japan Information Processing Service Co., Ltd.	JIP/BRS, IRSPAN
Japan Patent Information Center (JAPATIC)	PATOLIS
Fujitsu FACOM Information Processing Co., Ltd.	PPDS
Heiwa Information Center	HINET

(Source) See Footnote 5

Table 10. List Of Database Service Industry Association Members

Asahi Shimbun, Ltd.
Asahi Research Center Co., Ltd.
Intec Inc.
Mets Ranching System Co., Ltd.
Chemical Information Association
Kyodo News Enterprize
Kinokuniya Co., Ltd.
Quotation Information Center K. K.
Marketing Intelligence Corp.
Jiji Press Co., Ltd.
Sumika Technical Information Service, Inc.
Century Research Center Co., Ltd.
Dia Research Institute, Inc.
Teikoku Data Bank, Ltd.
Information Services International Dentsu, Ltd.
Tokyo Shoko Research, Ltd.
Toyo Information Systems Co., Ltd.
System Development Corp. of Japan, Ltd.
Nihon Keizai Shimbun, Ltd.
The Industrial Bank of Japan, Ltd.
Nihon Shuppan Inc.
Japan Information Service Co., Ltd.
Japan Information Processing Service Co., Ltd.
Japan Management Association
Nomura Computer Systems Co., Ltd.
Nomura Research Institute
Fujitsu FIP Co., Ltd.
Maruzen Co., Ltd.
Mitsubishi Chemical Industries, Ltd.
Mitsubishi Research Institute Inc.
Ricoh Co., Ltd.

(Source) See Footnote 1

DATABASE UTILIZATION IN JAPAN

1. Number Of Users

The estimated number of users of database services in Japan by type of service can be broken down as follows: users of scientific and technical data services – roughly 1,200; users of newspaper and magazine article data services – roughly 1,000; users of world patent, pharmaceutical and chemical documentary information services – about 1,000; users of domestic patent information services – roughly 820; and users of securities and financial information services – roughly 800. All of these users receive these services on a contract basis. Also, large numbers of users avail themselves of more than one type of database service.

Approximately 1,000 users had entered into contracts for ICAS services as of July, 1982. This fact indicates considerable interest in foreign database services.

Table 11. Businesses Entering The Database Service Industry

Original Business	Number of Companies
Newspaper/Wire Service	4
Bookstore/Publishing Agent	3
IP/Information Service Center	7
Software House	2
Research Institute/Group	8
Educational Association	1
Financial Institute	1
Credit Investigation Company	2
Manufacturer	3
Total	31

(Source) See Footnote 7

2. User Needs

A study done by Hosono et al [2] revealed that document databases dealing with the fields of science and engineering are utilized by an overwhelmingly large number of users, as Table 12 clearly

shows. It also indicated that users of fact databases such as NEEDS-TS, MARK III and QUICK, were interested primarily in information on economics and business. A special characteristic of database utilization turned up by this study was the fact that numerous users are not only retrieving needed data, but also having tables and graphs prepared and statistics analyzed, as well as availing themselves of other data analysis services such as the preparation of models and their analysis by means of computer simulations.

Table 12. Top 14 Databases By Number Of Users

Rank	Database	Number of Users
1	CHEMICAL ABSTRACTS	91
2	JICST Science and Engineering	86
3	TOXLINE	55
4	MEDLARS	54
5	BIOSIS	44
6	EXCERPTA MEDICA	43
7	JICST Clearing Information	38
8	NTIS	38
9	COMPENDEX	34
10	PREDICASTS	33
11	INSPEC	33
12	WPI	25
13	CAB	21
14	RINGDOC	11

(Source) See Footnote 2

Table 13 provides the results of a study into database utilization conducted in 1983 by the Japan Data Communications Association [3]. These results seems to indicate that future users (1) will make use of a number of different databases simultaneously; (2) will use a number of similar databases in parallel (multiple retrieval), especially for data related to medicine, patents and economic statistics; and (3) will make use of domestic databases (such as JICST, PATOLIS) and overseas databases (such as DIALOG and SDC) together.

These trends should apply equally to both document and fact databases. And if they do, user will probably also make good use of databases (1) to expand their sources of information [they will use similar databases to avoid gaps in their data]; (2) to combine different types of information [they will combine information from different fields, by using multi-purpose, integrated databases which will enable them to analyze their company's strategies based on such diverse data as a rival company's R&D trends and general financial information]; and (3) to compare and analyze data obtained domestically with that retrieved from overseas databases. It is also reported that certain users will start to train their own database specialists in-house.

According to a 1981 survey on database utilization trends conducted by JIPDEC [4], in future, database utilization will increase across the board with the gap between document database usage and that for fact databases disappearing as users begin to utilize both with equal frequency. The results of that study also pointed to an increase in the utilization of new electronic media capable of processing the information contained in image databases.

The demand for database services is

Table 13. Current Status of Database Utilization

Number of Types of External Databases Used by Companies	21 types	10 types	6 types	5 types	4 types
	1 company	2 companies	2 companies	1 company	2 companies
In-house Databases	Have (4 companies)		Under Consideration (3 companies)		Don't Have (1 company)
	(Reasons for maintaining in-house databases: multi-purpose use; put files (data) in order; store technological reports; and for use in research.)				
Joint Processing of In-house and External Databases	Processed by Computer	Retrieval Results from In-house/External Databases Processed by Hand.		Under Consideration	Not Processed
	0	1		3	4
Multiple Retrieval Operations Involving Numerous Databases	• Multiple Retrieval Carried Out For Almost Databases (5 companies) • Multiple Retrieval Performed As Necessary (3 companies)				
Type of Retrieval Operators	• Designated Specialists (7 companies) [Specialists needed due to general lack of computer proficiency] • Regular Company Personnel (1 company) [Think tank where employees used to operating computers]				

(Source) See Footnote 3

Note: This table shows the results of a hearing conducted to determine database utilization at the 8 leading user companies of those firms which participated in the 1982 experimental system linking JOIS with the JAPAN/MARK (DEMOS). [Source: See Footnote 8]

thus seen as increasing and becoming more diverse and complex in future.

Another factor indicated by the data presented in Table 13 is that there will be an increasing need for the construction of in-house database (private databases) in addition to the utilization of outside database services. This suggests that it will be necessary to combine outside information available to the public with in-house, private information in order to come up with the data needed to formulate company policy and strategies.

There is also evidence that users would like to see the following improvements made regarding database utilization [3]. Database service vendors will, therefore, have to be sure to address these issues in future. The sought after improvements are:

1) The establishment of clearing centers;
2) The standardization of commands;
3) The preparation of thesauruses;
4) The protection of privacy [control of passwords, etc];
5) The opening of government databases for private use; and
6) The merger of databases with new forms of electronic media.

FUTURE THEMES REGARDING DATABASE SERVICES

1. The Construction Of Japanese Databases

Rising demand for database services in Japan will require that more effort be put into the creation of domestic databases, while at the same time striving to introduce and promote the widespread

Table 14. Government Data Which DB Service Vendors Feel Should Either Be Made Public Or More Easily Accessible.

Types of Data (Statistics)	Name of Magnetic Tape (Where Applicable)
Industrial Statistics (a)	Industrial Statistics *
MITI Vital Productivity Statistics (a)	Mining and Manufacturing Productivity Index
Consumer Trends Research [Unmarried Workers, Family Finances] (b)	Consumer Trends
Trade Statistics	Trade Statistics
Commercial Statistics (a)	Commercial Statistics
Monthly Labor Statistics (a)	Monthly Labor Statistics
Business Trends Index	Business Trends Index
Construction Starts Statistics (a)	Construction Starts Statistics
Consumption Levels	Consumption Levels
Household Economy Research (a)	Household Economy Research (Personal Data Files)
Nationwide Highway/Road Transportation Studies	Nationwide Highway Transportation Studies
Population Census (a)	Population Census
Vital Commercial Statistics (a)	Vital Commercial Statistics
State Of The Nation Surveys (a)	State Of The Nation Survey Files
Statistics On Business Establishments (a)	Statistical Files On Business Establishments
Corporate Investment Trends (b)	Corporate Investment Trends
Statistics On Orders Received For Machinery (b)	Order Received For Machinery
Study Of Estimated Machinery Orders (b)	Machinery Orders
Special Service Industry Statistics (a)	Special Service Industries Study
Nationwide Consumption Survey (a)	Nationwide Consumption Survey Files
Automobile Transportation Statistics (a)	Automobile Transportation Statistics
Basic Survey of Schools (a)	Basic Survey of Schools
Basic Survey of Industry (a)	Basic Survey of Industry
Basic Survey of Commerce (a)	Basic Survey of Commerce
Vital Statistics On Petroleum Products Demand (a)	Vital Statistics On Petroleum Products Demand
Survey On The Regional Movement Of Goods	Survey On The Regional Movement Of Goods

* A considerable amount of data is already available to private citizens in the form of magnetic tapes.

(a) Specified Statistical Research: Research specified by the head of the Administrative Management Agency, in accordance with Article 2 of the Statistics Act, to produce statistics for publication.

(b) Approved Statistical Research: Statistical reports approved by the head of the Administrative Management Agency in accordance with Article 4 of the Statistical Reports Adjustment Act. Also known as adjusted reports.

(Source) See Footnote 1

use of high-quality, information-rich foreign-produced databases. It will be extremely important to produce databases using information available domestically, and to promote the distribution (export) of these Japanese databases overseas.

In order to accomplish this, measures similar to those adopted by other advanced countries will be needed here in Japan as well. To begin with, it will be imperative that the government open its data resources to the public and improve methods for utilizing that

information. Table 14 is a list of the types of information the Database Service Vendor's Association would like to see the government make public.

The next important aspect of producing Japanese databases will be the development of technologies for retrieving the data contained therein, functions such as the following.

(1) Keyword Extraction Technology

The extraction of keywords from primary sources of information stored in computers requires functions capable of recognizing words and parts of speech, and dividing and generating compound words. Advances in technology for analyzing the Japanese language and the perfection of Japanese-language thesauruses are making possible the practicalization of Japanese-language keyword extraction systems.

(2) Automatic Translation Technology

Examples of two automatic translation systems currently on the market are the SYSTRAN and Weidner ALPS systems developed in America. SYSTRAN, for instance, is capable of automatic translation from English into French, German, Russian and four other languages, plus of course from those 7 languages into English.

Research into automatic translation is being carried out in Japan as well, primarily from Japanese into English and vice versa. A project entitled "Research Into Systems Capable of Rapid Japanese-English/English-Japanese Translations Of Scientific And Technical Documents," was started in 1982 by the Science and Technology Agency and is expected to produce good results.

2. Database Networks

In order to deal with the diversifying needs of users and their multi-purpose utilization of databases, some sort of database integration will have to take place. To achieve this, two possible measures can be put forth: (1) The centralization of databases at database centers; and (2) the interconnection of distributed databases to form networks.

The first of these possible measures, which calls for the integration of databases and their subsequent centralization at special database centers, is not really feasible when you consider the numerous distributors already engaged in the provision of database services throughout the country. Therefore, the latter measure, i.e. the interconnection of distributed databases via networks would appear to be the more practical of the two. This approach would not only prove convenient from the standpoint of access to Japanese databases from overseas, but would also be extremely significant as a means of promoting the international distribution (export) of databases produced in Japan.

Two rather interesting projects are being advanced in Japan regarding this type of distributed database system. The first of these is an experimental database network put together by the Ministry of Posts and Telecommunications (MPT) in 1982. This system successfully links the JICST JOIS database

to the Nippon Telegraph and Telephone Public Corporation (NTT)'s DEMOS-E database communications center via 9,600 bps leased circuits, enabling access to both databases through public telephone lines (See Figure 1). This experiment is the first step toward the realization of other similar distributed database systems in Japan.

The second Japanese project related to distributed database networks was started in 1981 by the Science and Technology Agency, and is scheduled to take five years to complete. This project is being carried out under the banner of "Research Into Advanced Utilization Of Chemical Compound Data Via Shared Networks," and as Figure 2 indicates, is designed to provide access to a number of different databases containing information on chemical compounds via a shared network system. Although fact databases will predominate this system, plans call for ready access to document databases as well. When completed, users of this system will be capable of satisfying just about all their chemical compound information requirements using a single shared network (See Figure 3). To make this system as optimal as possible, it will also be necessary to equip each database location with the appropriate clearing functions.

If distributed database network systems such as these become a reality, it will be possible to utilize a number of different databases at once. Accessing document and fact databases and/or document and image databases to obtain the most complete information service possible will soon become feasible. When this happens, we will then have to consider what types of database management systems (DBMS) will be best to handle this type of access.

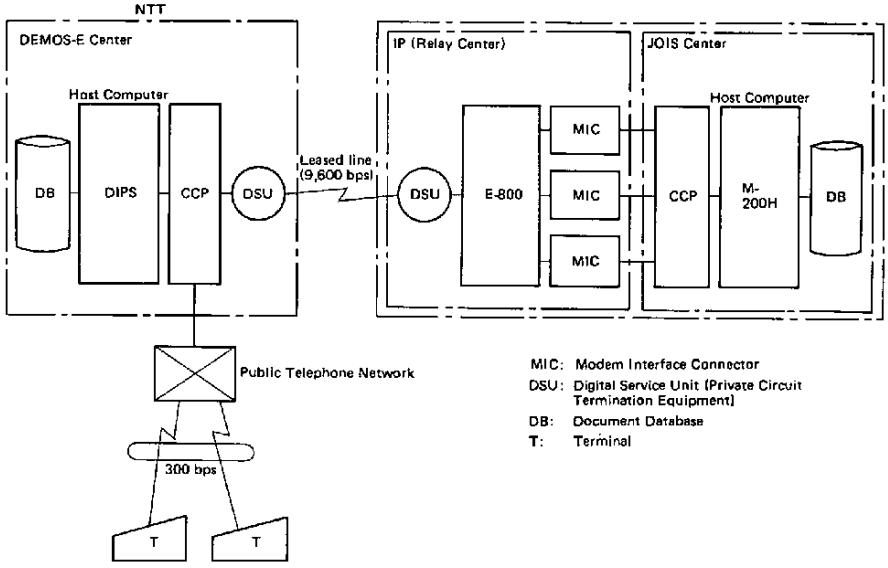


Fig. 1. MPT Distributed Database Network System

Also, as it becomes possible to access numerous databases at the same time, it only follows that users will have to combine the data obtained via those outside databases with the information in their own private databases for efficient processing.

From the technological standpoint, the standardization of the different retrieval commands used to access different databases, a fact which has proven a big headache to large numbers of users up to now, will have to be undertaken. Possible solutions lie in the standardization or conversion of such commands, both of which pose considerable problems. This is one reason everyone related to this field here in Japan is so anxious to see how the chemical compound information network system discussed above will turn out.

In cases where a number of different document databases are to be accessed, users will want complete thesauruses to make this task as simple as possible.

Before we can hope to realize systems

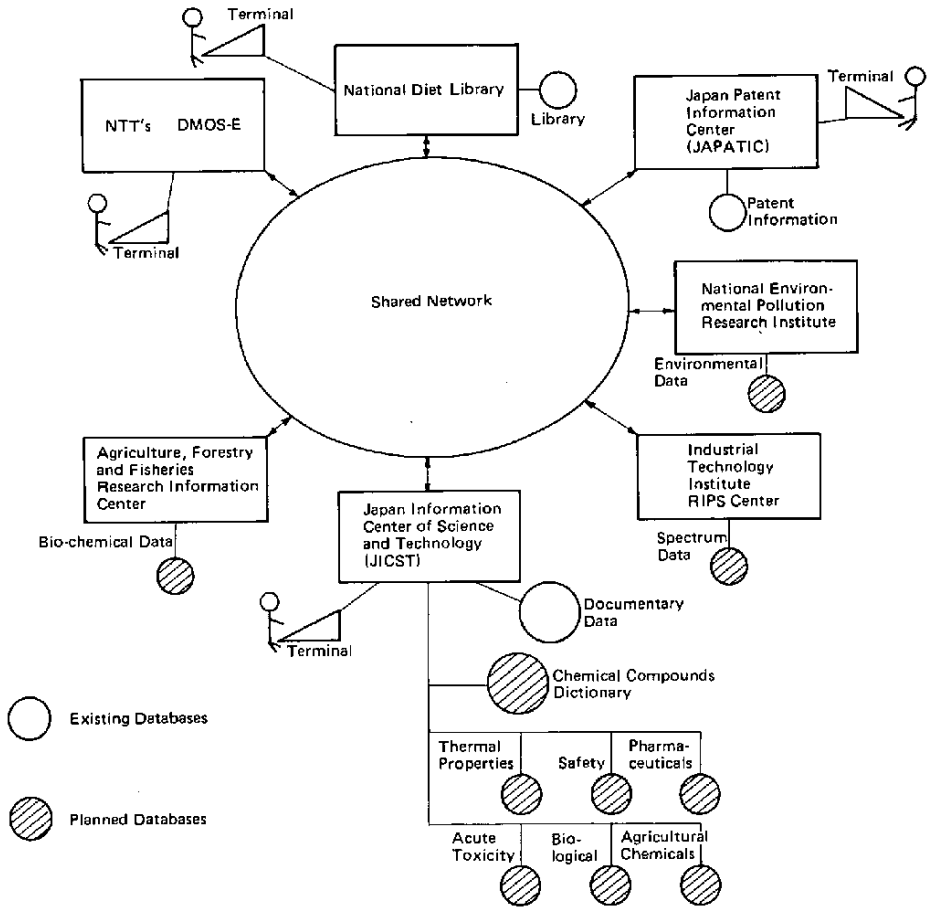


Fig. 2. Conceptual Diagram Of An Integrated Chemical Compounds Information System

such as those described above, which enable users to access a number of different distributed databases via a shared network, several requirements will have to be fulfilled first. These include the following:

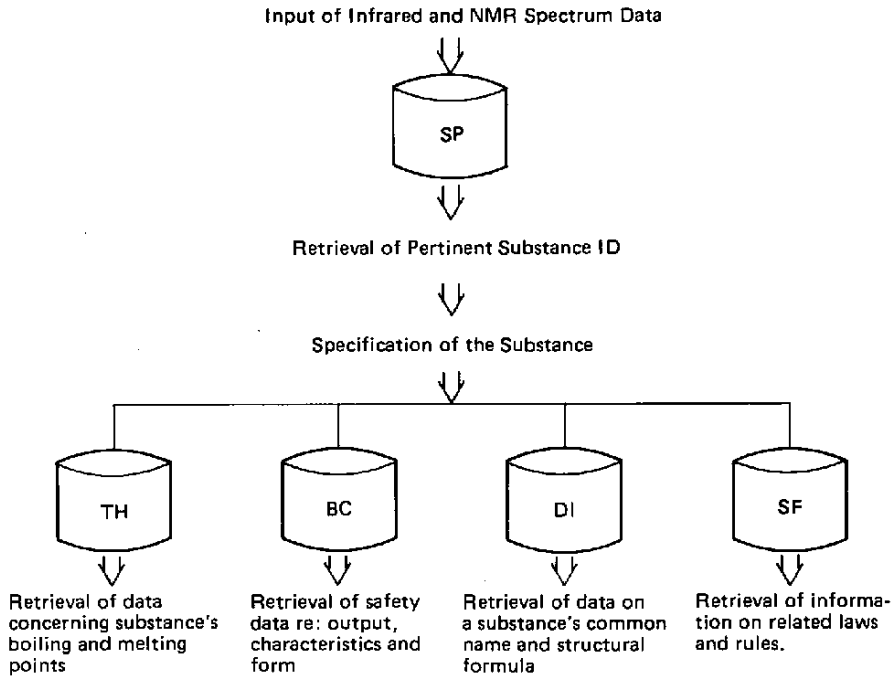
1) The ability to readily access a number of different databases using existing systems (DBMS);
2) The ability to combine and process data obtained from a number of similar databases;
3) The ability to combine and process data obtained from a number of different types of databases; and
4) The ability to improve network systems by standardizing and/or converting the commands used to access the various databases linked via those networks.

3. Copyright Problems

As shown in Figure 4, copyright issues surrounding databases are generally broken down into three major problem areas:

1. Copyrights on primary information;
2. Copyrights on the information contained in databases; and
3. Copyrights on output information (printouts).

Current laws regarding these copyright problems are unclear on numerous points, meaning that the issues which must be dealt with are also numerous.



(Source) See Footnote 5

Fig. 3. How A Chemical Compound Database Is Used

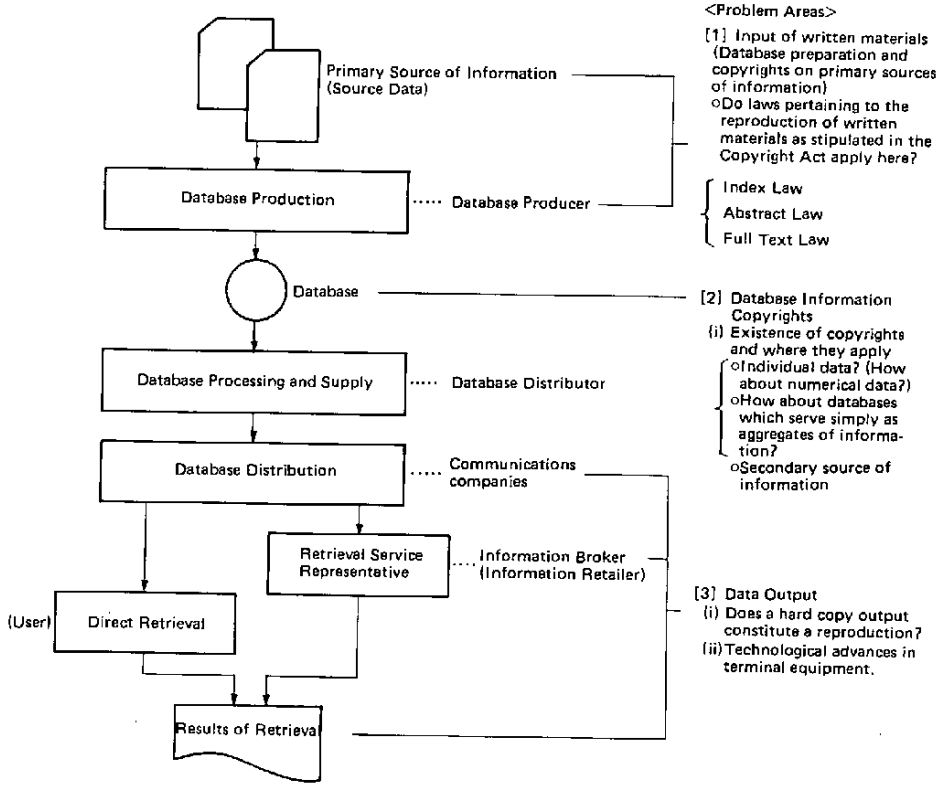
These various problems are presently being looked into by such organizations as UNESCO, WIPO and the OECD.

4. Problems Concerning Privacy

Since the early 1970's such countries as Sweden, the United States, France and Denmark have been enacting privacy and data protection laws to protect individual rights. However, here in Japan, these problems have yet to be dealt with in any specific way. Since Japan is now seriously considering promoting the export of Japanese databases overseas, it will also have to come to grips with the problems of privacy and data protection.

5. Issues Involving TDF

Issues related to transborder data flows (TDF) pose serious problems for database services which extend beyond national borders. Figure 5 indicates the extent of various problems and points of contention related to TDF. Today, databases are becoming the information resources of the nations which possess them. Japan must therefore give due consideration to the information gaps that exist between and among the advanced nations, as well as between the advanced and developing nations of the



(This flow chart represents the "Database Utilization Procedures," established by the Asahi Research Center.)
(Source) See Footnote 5

Fig. 4. Points of Controversy Surrounding The Problem Of Database Copyrights

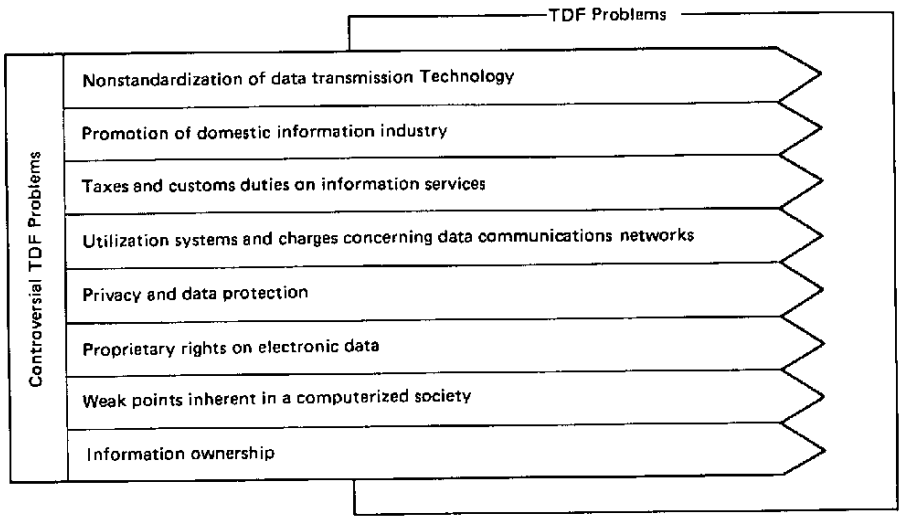


Fig. 5. Points Of Controversy Concerning The TDF Issue

economic North and South, and this in turn will mean dealing with TDF-related problems.

FOOTNOTES

1. Database Service Industry Association: DATABASE NO. 2 (1983)
2. Hosono et al: Documentation KENKYU 32 (10), pp. 473~484 (1982)
3. Osada, Hiroshi: Nihon Data Tsushin (Japan Data Communications), No. 25, pp. 7~12 (1983)
4. JIPDEC: "Trends and Issues Surrounding Japanese Database Services" (1981)
5. Ministry of Posts and Telecommunications: "Report On A Working Group Survey On The Promotion Of Overseas Database Distribution" (1983)
6. Ministry of International Trade and Industry: "Database Directory" (1983)
7. Science and Technology Agency: "Corporate & Information Activities" (1983)
8. Japan Data Communications Association: "Report on a Survey Into The Development of Database Utilization Technology" (March, 1983)

Special Report

HISTORIC JAPAN-US TELECONFERENCE
– Highlight Of International Symposium On Information '83 –

John McWilliams
President
The Word Shop, Ltd.

The morning of October 13, 1983, was shaping up to be a typical autumn day in Tokyo; slightly overcast and just a bit chilly. The trains were running on time, as usual, and the morning rush hour was crowded as usual. All in all, a pretty ordinary day. But not so at Yakult Hall in the Shimbashi district of Tokyo, where excitement was running high for members of JIPDEC and the Japan Information Processing Center Association (JIPCA), who were getting ready to kick off their jointly sponsored annual International Symposium On Information, which this year would feature a historic international teleconference, using both analog and digital satellite communications technologies.

The International Symposium On Information is co-sponsored by JIPDEC and JIPCA every year as part of these organizations' contributions towards Japan's annual Information Month activities. Leading figures from Japan and other countries around the world are invited to participate in this symposium as guest speakers to share their ideas and opinions concerning anticipated developments in the field of information processing. In view of the fact that 1983 had been designated as World Communications Year, JIPDEC and JIPCA decided to conduct ISI '83 around the theme of "The Impact Of New Electronic Media On The World Of Business," and to highlight the proceedings with a special international teleconference between Japan and the United States.

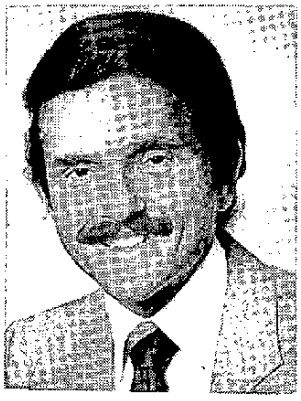
The chairman of JIPDEC, Mr. Yoshihito Shimada opened ISI '83 with an address which included remarks read from a letter he received from U.S. Ambassador to Japan Mike Mansfield, stressing the high priority of telecommunications in the continuing dialog between the United States and Japan and his wishes that the teleconference portion of the symposium"... stimulate demand for the increased use of video conferences."

Chairman Shimada's opening statement was followed by others from Mr. Hisashi Suzuki, Chairman of JIPCA; Mr. Manabu Shiga, Director-General of the Machinery and Information Industries Bureau of the Ministry of International trade and Industry (MITI), who spoke on behalf of MITI Minister Sosuke Uno; and Mr. Harvey L. Poppel, Senior Vice President of Booz-Allen & Hamilton, Inc. of the U.S., who had been invited to deliver the symposium's keynote

address prior to the start of the international teleconference demonstration.

THE STRATEGIC IMPACTS OF NEW MEDIA TECHNOLOGIES

In addition to being a senior vice president of the famous American consulting firm of Booz-Allen & Hamilton, Inc., Harvey Poppel also directs that firm's Information Industry practice. His 24 years in the field of information technology as a management and technology consultant have earned him an international reputation as a thought leader in the field of applied information technology. His most recent efforts have focused on research into what he sees as the three "super-segments" of the Information Industry for the 1980's: knowledge work, business operations and the home. His keynote address to the some 400 individuals who attended ISI '83 dealt with the subject of "The Strategic Impacts Of New Media Technologies," the key points of which are outlined below.



Harvey Poppel

The Information Industry (12)

At Booz-Allen & Hamilton, Inc., the Information Industry, referred to as 12 for short, is defined as embracing those businesses which produce information as content, as well as those businesses which provide the facilities with which information is handled, Poppel explained at the outset of his talk.

The 12 market in the U.S. amounted to $385 billion during fiscal 1982, he pointed out, adding that the revenues earned in this industry in Japan during that same period totalled about $93 billion, or roughly 1/4 of the U.S. consumption.

The Information Industry as such didn't really come into being until quite recently, when hitherto discrete businesses such as the computer, telecommunications and media businesses converged into a single homogenous industry as the result of new applications of information technology, what Poppel calls embedded processing.

Embedded Processing

Embedded processing is really the fourth wave of information technology to engulf us since the 1950's he said, the first three waves being defined more or less by means of how one computer either related or didn't relate to another, i.e. isolated computers, consolidated data centers and distributed processing, in that order. Embedded processing, isn't defined in terms of how one computer relates to another, but rather in terms of how the average individual relates to this technology. As it matures, em-

bedded processing will enable just about anyone to access (or be accessed by) computer power and electronically stored information wherever they may be – at their own workstation, visiting other business locations, in their homes or while travelling. "In other words, embedded processing refers to the fact that access to computer technology has become 'embedded' in our environment," he explained.

Business Operations, Knowledge Work And Home Markets

This revolutionary new wave of technological change, embedded processing, together with recent changes in the types of input/output devices which people use to interface with the new technologies, have sparked the growth of what Poppel termed "three huge 12 marketplace arenas" – the home, knowledge work and business operations. These markets are seen by Poppel and B-A & H as accounting for the majority of the growth in the use of new forms of electronic technology over the next 10 to 15 years. Poppel explained that the market he calls "business operations" refers to the use of new electronic technology in the mainstream production line functions of business, for the purposes of operations, procurement, physical distribution and the like. "Knowledge work" is the market related to use of the technology in thought-oriented business processes, such as the analysis of information, marketing, purchasing and engineering work carried out by managers of businesses and other professionals. Whereas most applications of electronic technology in the arena of business operations tends to be high volume, procedurally driven and pre-programmed, those for knowledge work are more apt to be occasional, limited and not high volume in nature. The types of technology employed in these two market-

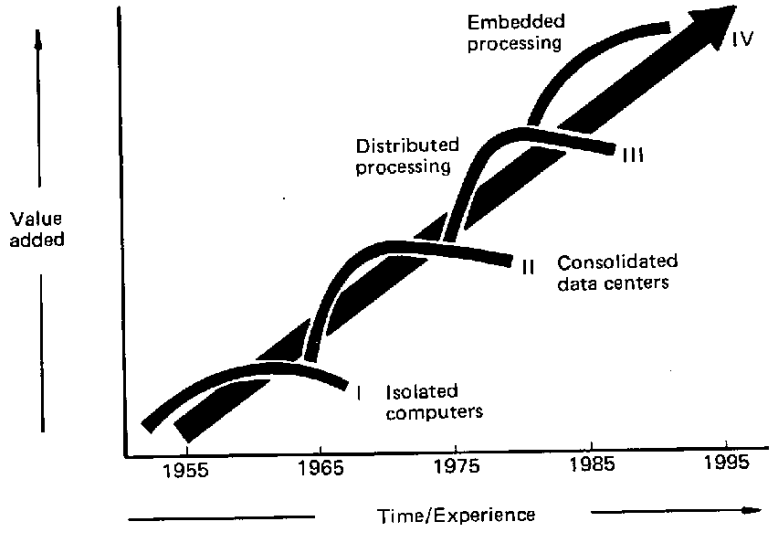


Fig. 1. A Fourth, More Revolutionary Wave Of Technological Change Is Now Upon Us

place arenas are therefore quite different. The "home" market, he said, is something we all relate to personally, and in some cases professionally as well.

Poppel went on to point out how these three markets are increasingly overlapping, a phenomenon which is bringing about fundamental structural changes in the Information Industry. The 12 companies that come out of this transition period winners will be those who grasp the strategic implications of a restructured Information Industry, and deploy their technological, human, material and financial resources accordingly, he predicted.

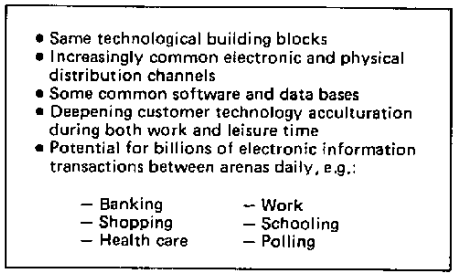


Fig. 2. The Business, Knowledge-work And Home Arenas Are Increasingly Overlapping

Business operations accounts for approximately 60% of total 12 expenditures in the U.S., he noted, stressing that every industry is changing its operations to take advantage of the new technology. "The benefits that 12 provides its customers are no longer limited to productivity improvement, but include the bigger benefit of helping customers achieve competitive advantage, helping them to differentiate their products and their position in the marketplace," he stated. The most dramatic of these applications in business are to be found in the factory, where total integration is being accomplished with the help of local and wide area networks.

Knowledge workers are supported by office systems or office automation, technologies which improve their performance as well as the quality of their work life. "In the U.S., businesses spend $1.3 trillion a year to support their white collar workers, the majority of which goes to support knowledge workers in the form of salaries, etc.," he said, but then added that, "Most external support expenditures, such as those related to 12, have been focused on clerical work rather than knowledge work thus far."

Since knowledge workers waste considerable time and are frustrated by this waste, the systematic application of office automation can save these workers and their organizations considerable time, money and frustration, he said.

The market Poppel showed the most enthusiasm for during his presentation, however, was the home market. He pointed out that the home market in the U.S. was already huge, with the average American household spending nearly $1,000 a year for telephone, broadcast and music systems, as well as printed publications and other 12 outputs What is more, he said, by 1990, new forms of home information systems (HIS) will have taken root and will inherit increasingly larger revenues from such industries as banking, retailing, education and travel by becoming an integral part of their

value-added structures. Overall, he predicted that the consumer would represent a $327 billion U.S. market opportunity in 1990.

New Products And Services

As examples of the types of new products and services that are reshaping the home market, Poppel included home computers and videogames, video cassette recorders and video disc players, teletext, videotex decoders, component and high definition televisions among the new products, and on the services side mentioned pay television, videotapes and videodiscs, direct broadcasting satellites and satellite master antenna television, low power TV, SCA and multipoint distribution systems.

Infotainment

Poppel then brought up the notion that since the hardware and distribution networks necessary to bring these new electronic technologies and media into the home are already in place, it would be software that determines how these information technologies are used in future. He suggested that the current trend is towards a merger of the information and entertainment businesses, something he calls "infotainment," which

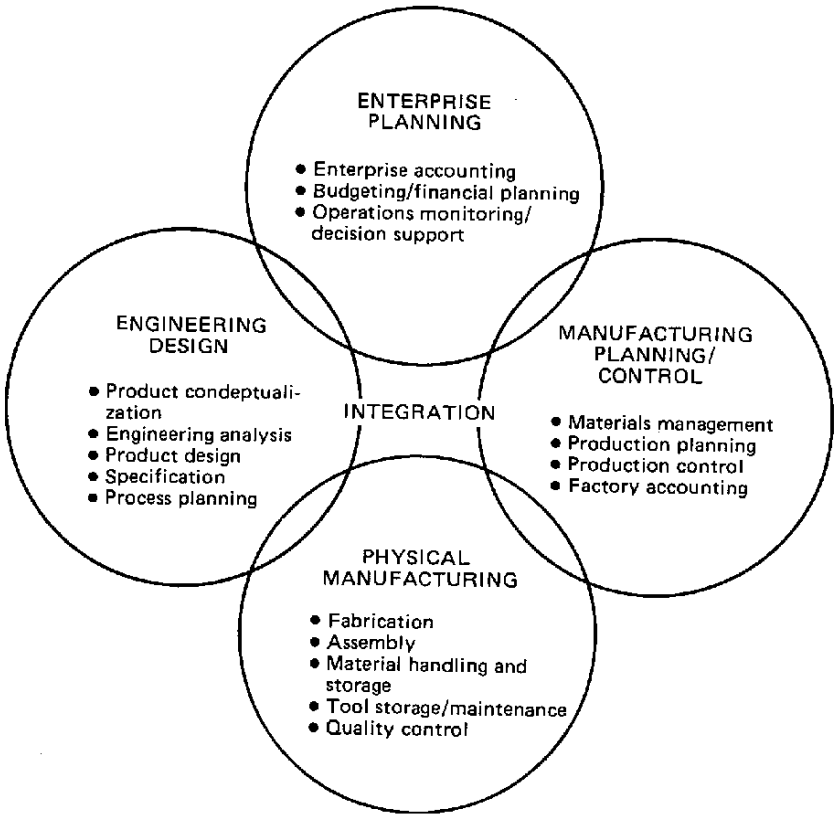


Fig. 3. Factory Of The Future: Logical Structure

will create whole new areas of interactive, participative entertainment and information acquisition services. These will include computer-aided art and music, educational entertainment (edutainment), information-oriented commercials (informercials) and teleshopping, among others.

Six Categories Of Strategic Competitors

He then launched into an explanation of the effects these changes – embedded processing, new forms of electronic technology and media and the unique new interactive services they make possible – are having on the structural makeup of the Information Industry. He pointed out that six categories of strategic 12 competitors were arising out of this revolution, composed of the largest 12-focused companies made up of the top dozen North American-based companies whose 12 revenues each exceed three billion dollars and comprise at least 85% of their total revenues; rapidly growing "niche" players comprised of several dozen relatively young, fast growing companies (growth rates of 25% and up) with comparatively narrow products and services who thereby derive at least 85% of their revenue from the Information Industry; more mature, medium-sized 12-focused companies such as Pitney Bowes, Nixdorf and Olivetti; the leading Japanese companies, such as Fujitsu and NEC, which are among the world's top 35 12 businesses; the large, less-focused western world multibillion dollar multinationals with traditional 12 positions accounting for 15-50 percent of total corporate revenues (GE, RCA, ITT and Siemens); and very large diversified newer entrants to the Information Industry with strong positions in other industries such as Exxon, Volkswagen, Sears and American Express. "These strategic worldwide competitors are repositioning their forces structurally to capture a profitable, defensible share of the 12 markets," he emphasized.

Japanese Firms Vulnerable

Despite their mounting technological prowess, Poppel claimed that the leading Japanese companies appeared vulnerable in this strategic realignment on several fronts, in particular in the areas of software distinctiveness, distribution channel upheavals and internecine competition.

He then touched briefly on the subject of strategies, stating that nearly every 12 business faces four critical interrelated sets of issues: productivity management, technology management, market management and overall strategic management. While stressing that all of these issues were extremely important, he identified the area of strategic management as the most critical when it comes right down to future success of failure.

Information Technology Management

The final portion of Poppel's presentation dealt with the social impacts of this information revolution. In general, he stated that he felt the impact of new electronic technology and media was

positive across the board, i.e. for individuals, businesses and industries alike. The biggest problem he and B-A & H see in future is the manager's capability to deal with what he described as the fourth wave of management change now upon us, that of information technology management (ITM).

ITM he defined as being similar to management information systems (MIS) and information resource management (IRM), but said that it was more comprehensive and strategic in nature, aimed at identifying and encouraging the prosecution of new embedded processing opportunities with strategic leverage.

In closing he stressed that "...one of the most formidable challenges facing 12 businesses in the mid-1980's is repositioning today's MIS/IRM executives into the more strategic role of ITM. The gut issue will be whether or not 12 businesses are prepared to utilize the new media technologies to take advantage of strategic opportunities."

JAPAN-US TELECONFERENCE

The afternoon session of ISI '83 started off with the anxiously awaited Japan-U.S. teleconference demonstration carried out in cooperation with Satellite Business Systems (SBS) of the United States, a private communications company owned by Aetna Life & Casualty Company, COMSAT General Corporation and IBM Corporation.

As stated earlier, this demonstration of international teleconferencing capabilities was undertaken to emphasize the importance of World Communication Year. More specifically, however, it was planned and carried out to demonstrate the effectiveness of teleconferencing as a tool in the conduct of international business.

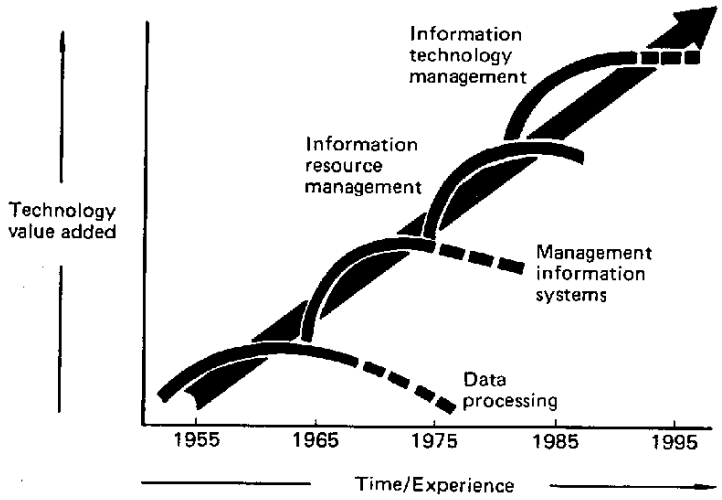


Fig. 4. Driven By The Potential Strategic Benefits Of Newer Information Technologies, A Fourth Wave Of Management Change Is Now Upon Us

SBS coordinated the event in the U.S. and was responsible for engineering the overall network configuration and transmission plan. The SBS domestic satellite system was used to carry most of the transcontinental U.S. portion of the teleconference, which extended from the videoconferencing room of an SBS customer in Hartford, Connecticut, to an international earth station in Jamesburg, California. JIPDEC/JIPCA arranged to have the trans-Pacific portion of the teleconference handled by a Pacific Ocean satellite owned by the International Telecommunications Satellite Organization (INTELSAT).

The chain of interconnections for the teleconference included an SBS satellite for digital wideband transmission between SBS earth stations on the premises of Aetna Life & Casualty in Hartford, the U.S. conference site, and Crocker National Bank in San Francisco. Temporary terrestrial facilities handled the transmission between San Francisco and the international earth station, operated by COMSAT, at Jamesburg, 125 miles to the south. The INTELSAT satellite parked over the Pacific carried the transmission between Jamesburg and an international earth station in Ibaraki, Japan, while temporary terrestrial arrangements completed the connections to the demonstration facilities set up at Yakult Hall in Tokyo, 90 miles south of Ibaraki.

The Tokyo-to-Hartford transmissions used freeze-frame techniques to transmit still pictures, and were notable in that they relied on standard dialed international telephone connections, with the video portion of the signal transmitted at 4.8 kilobits per second (kbps).

The Hartford-to-Tokyo transmissions,

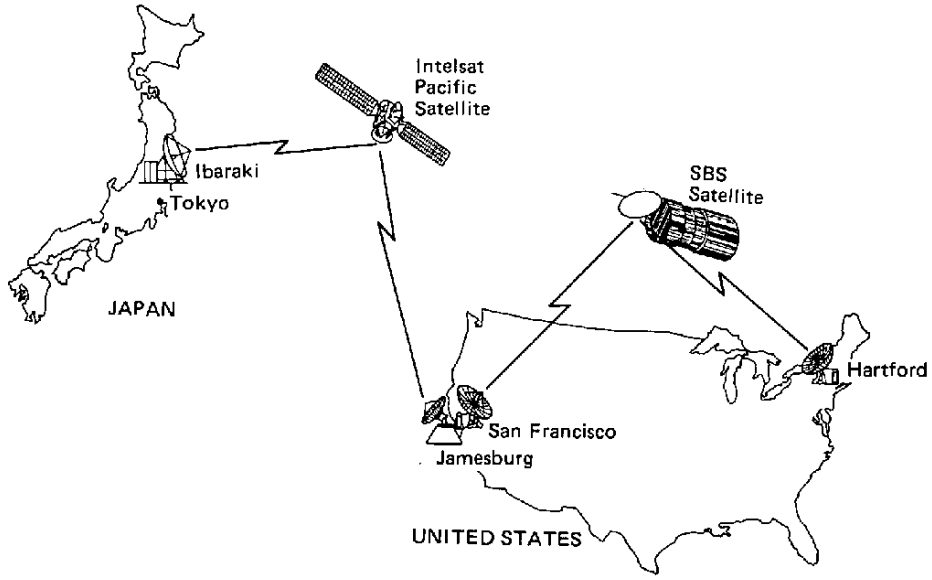


Fig. 5. Videoconferencing Links Used By SBS/JIPDEC-JIPCA 10-13-83

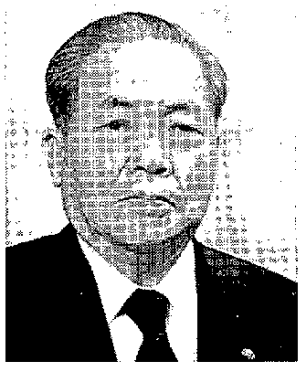
however, used digital compression devices (coders-decoders, or codecs) supplied by Nippon Electric Company (NEC) for the U.S. portion of the conference, permitting full-motion video to be carried through a 1.544-Mbps channel. According to the engineers at SBS, a non-compressed video signal would have required about 90 Mbps of capacity. The INTELSAT portion of the route involved full-bandwidth analog transmission.

Although there have been a few Japan-U.S. teleconferences held in the past, this particular event was significant due to the fact it was the first such teleconference to utilize double hopping through two satellites, one analog and the other a privately-owned digital satellite, to achieve effective meeting environments electronically over 8,000 miles of land and water. SBS installed a special Technical Control Center in San Francisco specifically for the teleconference to assure that signal quality was maintained at the interchange point between SBS and the other carriers.

The actual teleconference itself lasted around 90 minutes and featured speeches and a discussion session between participants on both sides of the Pacific revolving around the theme of ISI '83, "The Impact Of New Electronic Communications Media On the World Of Business."

The participants in the U.S. were Dr. Leo Esaki, an IBM Fellow at the IBM T. Watson Research Center, and Ray H. Fentriss, SBS Senior Vice President for Marketing. On the Japanese side were Dr. Koji Kobayashi, Chairman of NEC, and Yohei Mimura, President of Mitsubishi Corporation. Takao Nakayama, Managing Director of JIPDEC, hosted the event from the Tokyo site.

Chairman Kobayashi led off with a speech which touched on the possibilities for new electronic communications media and other new technologies involved in the field of computer-controlled communications, something NEC calls "C&C." He pointed out that a variety of problems arise when these capabilities are extended across national borders, and mentioned the standardization of protocols and need for automatic translation systems as two examples of these problems.

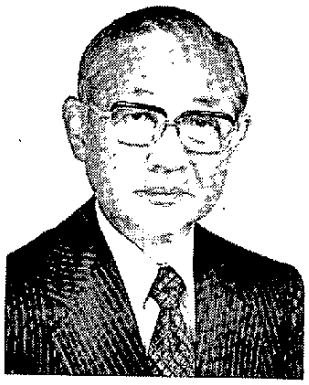


Koji Kobayashi

He wound up his talk by stressing the multi-layered nature of communications systems, with the public system serving as the pipeline for the other two, as well as the communications infrastructure for society as a whole. He said that new forms of electronic media currently being developed apply to all three layers, making it necessary to treat these new media in an integrated, interconnected

fashion in future.

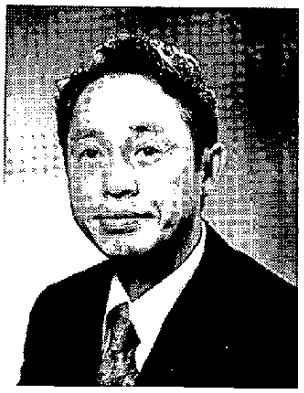
Mitsubishi's President Mimura was up second and focused his talk on three major points: the roles of various new electronic media in the area of international cooperation, especially business operations; ways of dealing with increased diversification and individuality resulting from the rise of advanced information societies; and a definition of what information means to the large Japanese multinational trading houses, the SOGO SHOSHA.



Yohei Mimura

At one point he referred to John Naisbitt's recent book titled "Megatrends – Ten New Directions Transforming Our Lives," saying that we should beware not to concentrate solely on what Naisbitt called the "high tech" aspects of communications, i.e. the new electronic media and other communications technology, without also being aware of the need for "high touch" forms of communications, those which involve person-to-person contact and interaction. "One of our key tasks," he said, "will be to find out just how much of a 'soul' these new technologies can be endowed with ... to determine whether or not software can be developed for 'high tech' media that will enable the provision of 'high touch' services."

The third speaker was Dr. Esaki, the recipient of a Nobel prize in physics in 1973. Dr. Esaki began his speech by saying that he had given numerous such talks to Japanese audiences in the past, but this was the first time he had ever done so from the other side of the Pacific Ocean and at 12 o'clock midnight (Since the teleconference was a realtime event, the U.S. participants had to be in the Hartford videoconferencing room from 12:30 to 2:00 in the morning, U.S. time.). He began by defining the term "new media" as new, experimental forms of electronic media which are being put to use in conjunction with other, more traditional forms of media. These new media will have to go through a period of trial and error, he said, and nobody knows for sure just what their future will be.



Reona Esaki

But one thing is for sure, Dr. Esaki stressed, "Information and the knowledge derived from it have been essential in business and social living, [and advances] in communications and information processing have been meaningful in so much that they support our intellectual endeavors and expand the scope of our minds." He continued by pointing out various problems currently afflicting people the world over, regardless of their nationality, such as environmental pollution and food shortages, and stressed the need for greater international cooperation to solve these issues. "However, there are many nations around the globe which have constructed walls of nationalism around themselves ... [and] media capable of transcending these [wells] must be utilized by businesses and other social organs ... for the prevention of conflicts and the promotion of international harmony and cooperation. This will be one of the major roles of the new media."

SBS's Ray Fentriss batted clean-up, and brought the previous three batters home with a neatly packaged summary of the history of electronic communications from its beginnings a little over a 100 years ago until today. He pointed out that the most significant recent improvement in electronic communications has been the use of large capacity digital technology in favor of the more constraining small capacity analog technology. The appearance of very promising alternatives to analog technology has pointed up the serious liabilities of conventional telecommunications facilities, he said, and went on to describe one such alternative technology in some detail – the communication satellites which form the basis of SBS's switched, digital, high-capacity private network system. One of the advantages of satellite technology not shared by even the most advanced terrestrial alternatives is something he called "distance insensitivity," that is, it costs the same to send a message 10 kilometers as it does to send it 1,000 kilometers when you have a satellite in orbit.

Ray Fentriss

Two other unique advantages of satellite communications technology which he mentioned are the potential for dynamically allocating transmission capacity among different points on the ground as opposed to ordinary fixed point-to-point connections, and the fact that every ground station can instantly communicate with every other ground station just by pointing itself at the orbitting satellite. He went on to stress the importance of digital processing to satellite technology, and added that

thanks to such processing, SBS was able to be the first company in the world to provide integrated-services digital network (ISDN) services to its American customers. "What does this all add up to?" he asked, "It adds up to important new levels of performance in the transfer of information ... [which for] 'information societies' [where] more of us make a living by handling, generating, manipulating and moving information than any other source ..., [being] able to handle information better has become a key to productivity growth and to our ability to compete."

On the topic of videoconferencing, Fentriss stated that this capability eliminates many of the usual delays in organizational decision-making and problem solving; makes the exchange of expertise easier and more frequent; reduces the great amount of valuable time that executives and managers now spend travelling to and from meetings; and saves the direct cost of travelling, which is growing higher all the time. The great potential of videoconferencing, high-speed data communications and document distribution are only just beginning to be realized, he stressed, adding that "... it would be a great misunderstanding to consider this demonstration just another exercise in the use of TV ..., rather [it is] an exercise in using new channels of communications that are not only new, but are vastly more flexible and cost effective than anything we have known before. The obvious dimensions that these services bring to the new shape of the world of business is the declining power of geography to dictate where our markets exist and how our economies are structured."

Following Mr. Fentriss's talk, JIPDEC Director Nakayama led the four participants through a question-and-answer type discussion session to give the demonstration the air of a real meeting.

Takao Nakayama

Some of the points brought out in this discussion session have been summarized below.

In answer to a question concerning the recent increase in the number of customers being serviced by SBS satellite systems in the U.S., Mr. Fentriss replied that the primary motivating factor on the part of new customers is to lower their long distance telephone bills, their biggest communications expense. To accomplish this, he said, SBS puts as much of the customer's long distance phone traffic across its sstellite system as possible, thus greatly reducing long distance charges. He added that after the earth stations have been installed to carry the client's voice traffic, then SBS begins

to implement some of its advanced applications, such as videoconferencing, high-speed data communications and facsimile, all on an incremental cost basis.

When asked to explain some of the possible future uses of satellite technology in Japan, the Japanese participants varied in their responses. Dr. Kobayashi pointed out that since the situation in Japan differs considerably from that in the U.S., new means of utilizing this technology will have to be developed in Japan, and cited as an example the use of satellite communication technology to quickly and efficiently carry out companywide inventories at all of a firms numerous locations, both domestic and overseas.

Mr. Mimura stated that the large multinational Japanese corporations were very interested in taking an active part in the provision of satellite-based communications services and were looking forward to the day when they would be able to own and operate their own communications satellites.

During the course of the discussion, Mr. Nakayama asked SBS's Fentriss to give his views regarding the future cost of launching and maintaining satellites in orbit. Mr. Fentriss replied that this involved two considerations: the improved costs of launching satellites using the space shuttle as opposed to disposable rockets; and the enhancements incorporated into each succeeding generation of satellites, which makes it possible to keep them in operation longer. The two dynamics of lower launching costs (it cost SBS $24 million to launch its second satellite using a disposable rocket, but only $9 million to launch SBS-3 via the space shuttle) and improved price-performance (the bigger, more powerful SBS-3 satellite is expected to remain operational for 10 years, whereas SBS had to settle for just 7 years of service life from its smaller SBS-1 and 2 satellites), he said, should continue to lower costs in future.

The question of liberalized regulations governing the international provision of satellite communication services prompted Mitsubishi's Mimura to state that it would be some time before Japanese regulations will be liberalized enough for private firms to provide such services on a regular basis. And besides, he added, the Japanese language and culture barriers are such that American data services may not be able to be used in Japan as-is anyway.

This led Dr. Kobayashi to reply that NEC engineers feel it will be possible to incorporate existing automatic translation systems into international telephone switching equipment which will enable simultaneous translation of overseas telephone conversations from Japanese to English and vice versa. He quickly pointed out that this technology probably wouldn't be commercially feasible for another 20 years or so, however.

Coordinator Nakayama interjected the point that too rapid technological advancement could stunt the growth of social studies and liberal arts-oriented education programs, but added that perhaps satellite communications could

play a role in broadcasting Japanese education programs to the children of Japanese businessmen stationed in various countries around the world who now find it extremely difficult to provide their children with traditional Japanese educations.

From his seat next to Mr. Fentriss in Hartford, Dr. Esaki expanded on that idea just briefly by adding that the automatic translation technology referred to by Dr. Kobayashi might also be put to use in cultural exchange programs to translate larger numbers of novels and works of poetry from Japanese into English and other languages, and vice versa, to promote better mutual understanding.

Mr. Fentriss was then queried as to the U.S. government's "Open Skies" and "Open Seas" policies concerning the field of satellite communications, which state in essence that any company with the financial and technical capabilities to do so may compete freely in this market in the U.S. He responded that the regulatory environment in America was undergoing considerable changes, as evidenced by the breakup of AT&T and the deregulation of many parts of the telecommunications industry. He predicted that other countries would probably follow suit and that the "Open Skies" and "Open Seas" policies would prevail, liberalizing the regulatory process all the way down the line.

Concerning a separate question regarding data security, Fentriss said that satellite technology perse is not all that secure, but that digital signalling in conjunction with time-division multiple access algorithms make unauthorized reception almost impossible.

The issue of what should be done in future regarding regulations governing telecommunications and the use of new forms of electronic media was also brought up. Dr. Kobayashi voiced his opinion that free competition in the communications industry would be desirable, but that before there can be really free competition in Japan, an advanced infrastructure would have to be developed, and that would require regulated development. Mr. Mimura agreed, adding that too much deregulation would quite likely lead to cutthroat competition and price wars, which in turn could heighten trade friction.

Mr. Nakayama summarized the discussion portion of the teleconference by saying that satellite communications seemed to be getting less expensive, a trend that would probably continue in future. Satellite technology, he went on, has eliminated problems related to distance, meaning that satellite-based communications services can be extended beyond national borders, thus contributing to the exchange of culture and better mutual understanding on the part of all nations. He emphasized the fact that new technologies should be developed and provided on a competitive basis, but that the protocols and standards necessary to effectively utilize the new forms of electronic communications technology should be established through international discussions.

PANEL DISCUSSION

Following this very successful demonstration of international teleconferencing, a panel discussion was held to delve more deeply into the theme of the impacts of new media on business.

The panelists brought together for this discussion included Harvey L. Poppel of Booz-Allen & Hamilton, who had been the key speaker during the morning session of ISI, Reikichi Shirane, President of the Telecommunications Science Foundation, Shiro Shimaya, Manager of the President's Office of Nihon Keizai Shimbun, Ltd., and Hiroshi Kitazawa, Director of JIPCA, the organization which cosponsored ISI '83 together with JIPDEC. JIPDEC's Nakayama once again served as coordinator of the activities.

While time and space do not permit a full account of this panel discussion here, some of the more pertinent comments to come out of it are presented below.

The Regulatory Environment

"Regulatory controls governing telecommunications are indeed necessary for the orderly development of the infrastructure so vital for the new technologies, but [remember], the more liberal the regulatory environment, the greater the impact of new forms of electronic media will be on business and society as a whole.

"Regulations are impeding the smooth development and utilization of new media and we in the industry have to work towards a better realization on the part of the general public as to what must be done to revise our regulatory system so that new media can be used more widely and efficiently in business applications." (Kitazawa)

Employment Opportunities

"The term 'New Media' includes all forms of computerized communications, networks and systems technology, as well as the content of the information itself.

Hiroshi Kitazawa & Shiro Shimaya

"One impact of new media on the world of business will be the creation of new types of industries, which in turn will create new employment opportunities and a stronger overall economy." (Shimaya)

New Media vs Old Media

"New media can do away with the disadvantages of old forms of media, such as the printed word, television and telephones, and is capable of expanding the horizons of businesses like the 'old media' never could.

Reikichi Shirane & Harvey Poppel

"The advent of new media and its impact on business is tantamount to the introduction of new forms of weapons. For example, when people who were used to fighting with swords and spears were suddenly confronted by guns and canons, their whole outlook on warfare changed, and they hurriedly set about rebuilding their castles and fortresses and adjusting their lifestyles to meet with the new technology. The appearance of the new media means that all industries are going to have to 'rebuild their fortresses,' to restructure their organizations and operations to take advantage of the new capabilities and ways of doing things that the new media bring with them." (Shirane)

The Manager And New Media

"Managers who aren't experienced in the use of the new media will have to begin to look at their business in terms of where in the business they actually achieve some competitive distinction or advantage ... [and] ask themselves if that's a part of the business that the new media can help them increase their advantage in, or conversely, if that advantage will be wiped out by the new media." (Poppel)

Monopolizing The Information Industry

"In Japan, we still have monopolistic corporations like KDD and NTT, which are the [communications] facilities providers in our country. Therefore, in order to prepare for our transition into an advanced information society, the very first thing we must do is generate a more competitive force to do away with the monopolistic nature of the facilities providers, so that we can activate the information industry in Japan." (Shimaya)

The Security Problem

"We think that the answer to the security problem is a combination of physical safeguards and policies. Physical safeguards relate to limiting access to certain information in the first place, to coding and encrypting that information during any form of transmission, and to using transmission facilities that are less likely to be tapped. For example, fiber optic systems are clearly the most advantageous forms of communications in terms of safeguarding the information within them. Policies [involve] really thinking about ... who need certain forms of information. [Concerning monopolies of communications systems], we think that as those problems are solved, greater attention will be payed to those who monopolize the content of information. There are many of those in the content

business, the database publishing business, who have a virtual monopoly on the production of information. And that will become an increasing concern once we clear up the problems of the monopolies in telecommunications." (Poppel)

CURRENT NEWS

JAPAN INFORMATION MONTH

The rapid spread of computer utilization and information processing in Japan has catapulted this country toward the early realization of a truly advanced information society. Computerization has radiated out from the fields of industry and business to penetrate into almost every aspect of Japanese life. This trend is expected to accelerate in future, making the computer and computer utilization even more ubiquitous than it is today. To assure the sound development of this advanced information society, it will be imperative that everybody, from government officials and business executives to factory workers and housewives, have a clear understanding and accurate perception of just what the process of 'informationalization' is all about.

For this reason, the Japanese government undertook as early as 1972 to designate the first week in October of each year as "Information Week," setting aside this time to enable citizens throughout Japan to attend various events sponsored by government and private organizations around the theme of information processing. In 1982, what had been a special week of information-related activities was extended to a month of such events, and the name of this specially-designated period was revised to "Information Month" to reflect the change.

Information Month '83, which opened with a special ceremony held in Tokyo on October 3, featured a total of 220 different events, ranging from exhibits of information processing and 'informationalized lifestyles,' to conferences and seminars on these and related topics. These events were held in cities in 44 prefectures throughout the length and breadth of Japan, from Hokkaido in the far north to Okinawa in the extreme south. A representative sampling of these various activities are shown in the accompanying table.

DATA SHOW '83

Data Show '83 was held for four days from October 18 through 21 at the Tokyo Harumi Exhibition Hall under the theme "Reliable Information Systems For A Better Tomorrow." Data Show '83 was sponsored by the Japan Electronic Industry Development Association (JEIDA), and was the 11th such show to be staged here in the past 11 years.

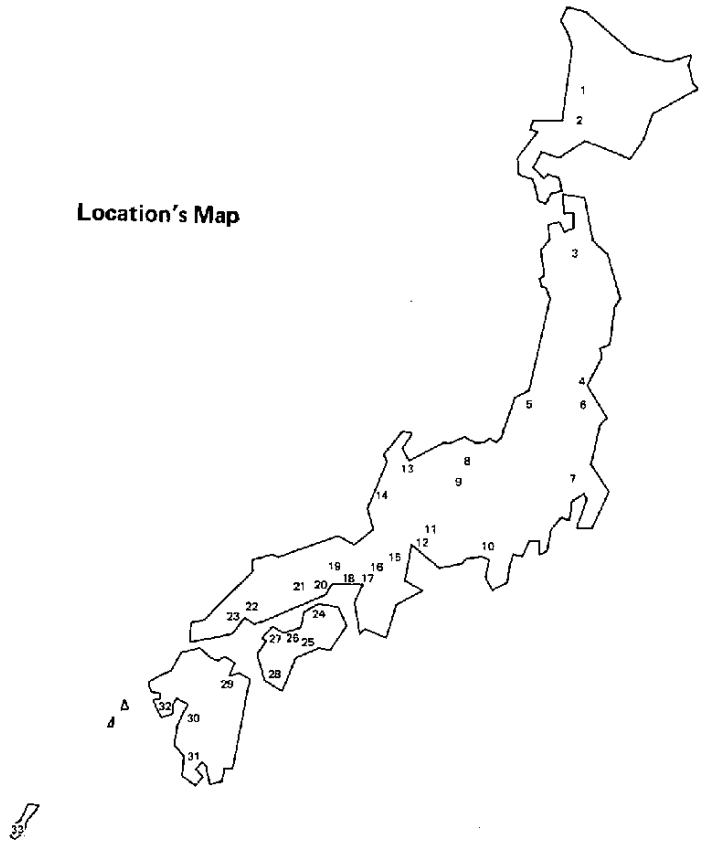
Table Of Information Month Events By Location

Location	Event
1. Naie	• Computer Lessons For Junior High School Students
2. Sapporo	• Life & Information Exhibit '83 Sapporo Conference "INS: Its Impact On Industrial Soceity" "Regional Advanced Information Systems" "Informationalization In Hokkaido"
3. Morioka	• Mobile Classroom "Business In The Age of OA"
4. Hitachi	• Introduction To Office Computers (Seminar)
5. Niigata	• Mobile Classroom "Business In The Age of OA"
6. Katsuta	• Microcomputer Courses (Beginner and Intermediate Courses)
7. Tokyo	• Information Month Opening Ceremony • Communications Exhibit '83 • "Travel & Computers" (Exhibition) • Life & Information Exhibit'83 "Electronics Art & Communications" • Data Show '83 • Medical Information Systems (Exhibit) • Software Show '83 • International Communications (Exhibit) • Exhibits and Lectures on New Media and Related Equipment • Exhibits and Seminars on OA Equipment for Small- and Medium-Sized Companies • '83 International Broadcasting Equipment Exhibition • Panel Discussion "OA And Communications" • Conference "OA Applications In Government Administration" • Symposium "Government Administration And Information Systems" • Conferences "CATV: Present And Future", "Electronic Banking" • International Symposium On Information (Japan-US Teleconference) • Data Show '83; International Symposium • Software Convention '83 "Strategies For Strengthening The Software Industry" • Conference On OA Systems For Small- And Medium-Sized Business • Conference "Outlook For Advanced Information Societies And Business Strategies To Cope With Them" • Conference "Advent Of The Age Of Satellite Communications" • Conference "Advanced Information Society & Communications" • '83 Data Processing Assembly • Conferences "Computer Security", "INS & New Media" • Conference "Distribution Information System Network" • Symposium "Case Studies Of Distribution Information Systems" • SHIPNETS — demonstration and lecture • Microcomputers In Medicine (Seminar) • Symposium "People, Information & Communication" • System Audit Conference • Symposium "Impact Of Advanced Information Society On Business' • OA Seminar • Office Automation Using Microcomputers • Conference "Probems Surrounding Office Automation"

Location	Event
	• Technology Research Meeting On Computer Utilization • Patent Information and Information Management Seminar For Businessmen • '83 Patent Information Fair • Special Research Meeting On LAN • Special Research Meeting On Multifunction Workstations • Database Fair '83 (Tokyo) • IPA Technology Center Meeing "Invitational Conference & Announcement Of Research Results" • Outstanding Engineer Awards • Regional Public Body Computer Personnel Awards
8. Nagano	• Information Management Conference
9. Matsumoto	• Computer Consultations
10. Shizuoka	• Computer Classes Aimed At Junior High School Students
11. Gifu	• How We Will Communicate In Future (Exhibition) • Conference "INS & Business"
12. Nagoya	• Telecommunications Fair '83 Nagoya • Symposium "Administration & Information Systems" • Chubu Public Testing And Research Guidance Bureau Case Studies Of Computer Applications • Patent Information & Information Management Classes for Businessmen
13. Takaoka	• High School Computer Seminar • Patent Information & Information Mangement Classes for Businessmen
14. Fukui	• Personal Computer Fair '83 • Seminar "Japanese OA Designs"
15. Otsu	• Conference "Database Systems"
16. Kyoto	• Microcomputer Classes For Junior High School Students
17. Osaka	• Exhibition "Communications For A Better Advanced Information Society" • Informationalized Lifestyles '83 • Electronics Show '83 • Symposium "Administration & Information Systems" • Conference "Case Studies Of Advances In OA" • Informationalization Symposium • Informationalized Citizens Meeting • Microcomputer Classes For Junior High School Students • Impact Of Advanced Information Age On Business • Symposium "Crime & Security In The Informaton Age" • Lectures And Seminars On Microcomputer Programs for Medical Use • Osaka Business Fair '83 • Database Fair '83 (Osaka) • Promotion of Standards For Science & Technology Information Distribution Systems • Patent Information & Information Management Classes For Businessmen
18. Kobe	• Microcomputer Classes For Junior High School Students
19. Ashiya	• Seminar "Accomplishments In The Osaka-Kobe Region"
20. Himeji	• OA Show • Computer Seminar
21. Okayama	• Mobile Classroom "Business Computers In The OA Era"
22. Misugi	• OA Seminar
23. Hiroshima	• Conference "Business In The Information Society" • Computer Classes For Junior High School Students • Patent Information & Information Management Classes For Businessmen • Hiroshima Microcomputer Training Session

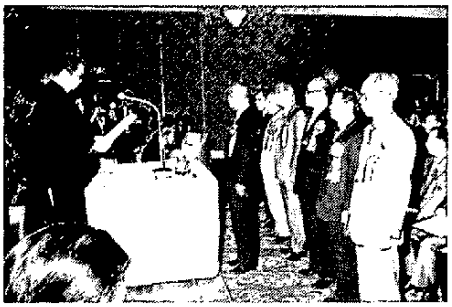
Location	Event
24. Takamatsu	• Symposium "Administration & Information Systems" • Computer Seminar For Small- And Medium-Sized Businessmen
25. Kochi	• Mobile Classroom "Business Computers In the Age of OA"
26. Niihama	• Telegraph & Telephone Exhibit
27. Toyo	• Computer Seminar For High School Students "Role of Engineers In The Information Society"
28. Uwajima	• Telegraph & Telephone Exhibit
29. Oita	• Life & Information Exhibit '83 Oita • Oita '83 Microcompuer Fair • Conference "Advanced Information Society & INS"
30. Kumamoto	• Kumamoto '83 Informationalized Lifestyles Exhibit • Kumamoto Technopolis Fair '83 • Conference
31. Kagoshima	• '83 Southern Japan Office Automation Exhibit
32. Nagasaki	• Public Conference On Advanced Technology • Exhibition Of Communications Equipment
33. Naha	• Conference "What Information Means To The Company"

Location's Map

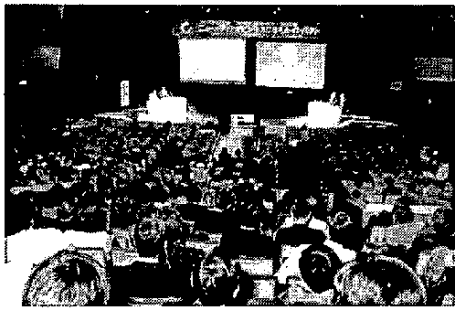


Photos of Information Month Events

Information Month Opening Ceremony

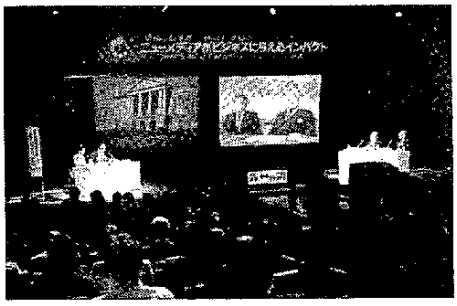


Commendation Ceremony



International Symposium on Information '83

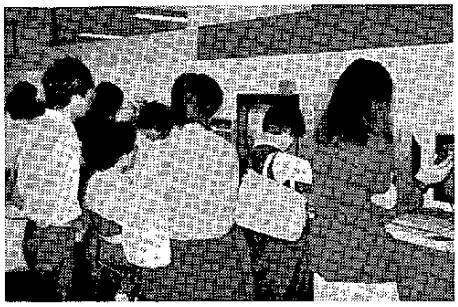
Software Show '83



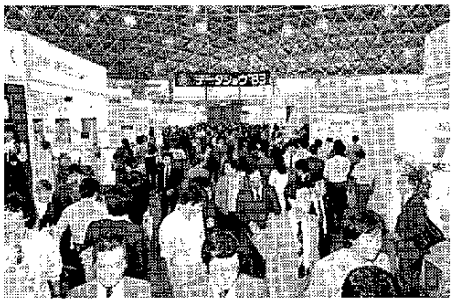
Japan-U.S. Teleconference

Software Show '83

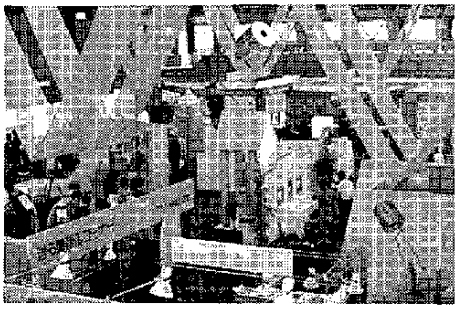
Photos of Information Month Events



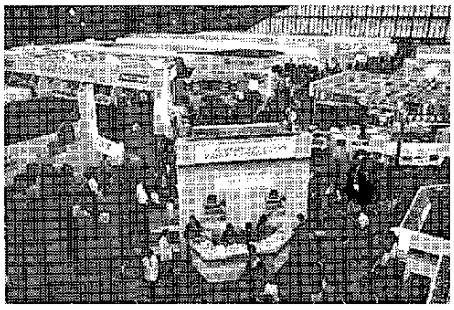
Life & Information Exhibit '83 Tokyo



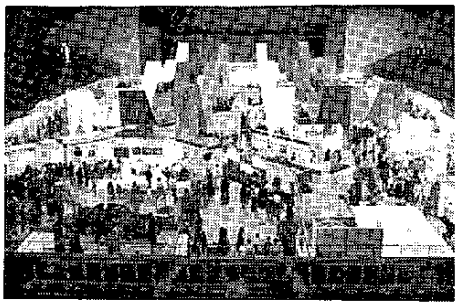
Data Show '83



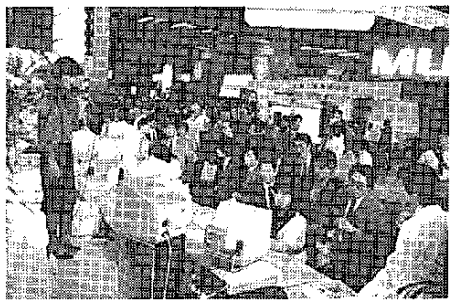
Life & Information Exhibit '83 Kumamoto



Data Show '83



Life & Information Exhibit '83 Oita



Data Show '83

The number of companies to display exhibits at this year's show rose to 129, up two over last year's figure. Only around 134,000 people turned out to view Data Show '83, down some 35,200 from last year, but there was still a considerable amount of jostling going on inside the exhibition hall.

New trends evident at this year's show included practical, ready-to-use local area networks (LAN); an increased number of software exhibits; and advances in graphics and Japanese-language processing technologies.

Although LANs have lost a good deal of their newness, almost every participating company this year displayed network systems designed around workstations. The types of machines most often seen at Data Show '83 were personal computers and Japanese-language word processors. Two interesting points about personal computers that were quite noticeable this year were the facts that Japanese manufacturers employed "mouse" I/O devices on their machines for the first time, and multi-function business computers were the leading models shown. Japanese-language word processors in the 1 million yen price range were notable for their improved performance, functions and ease-of-use. Another conspicuous point of this year's show was the progress made on using personal computers as word processors and turning Japanese-language word processors into personal computers.

SEVEN TRILLION YEN COMPUTER INDUSTRY BY 1990

According to a recently compiled report titled "Electronic Industry Demand Forecast" put out by the Japan Electronic Industry Development Association (JEIDA), production of computers and related equipment will climb to the 7 trillion yen mark by 1990.

The biggest jump in demand is predicted for office and personal computers, which are seen as growing at an average annual rate of 20% or more from now until at least 1990. General-purpose computers are also expected to continue to grow in double-digit figures until 1990.

General-Purpose Computers And Related Equipment

(Amounts in 100 millions of yen)

Item \ Year	81	85	88	90	Average Annual Growth Rate		
					85/81	90/85	90/81
Production	14,684	23,975	35,057	44,351	13.1%	13.1%	13.1%
Domestic Demand	—	23,898	34,396	43,222	—	12.6	—
Exports (Percentage)	—	2,597 (10.8%)	3,645 (10.4%)	5,655 (12.8%)	—	16.9	—
Imports (Percentage)	—	2,520 (10.5%)	2,984 (8.7%)	4,527 10.5%)	—	12.5	—

Personal Computers

(Amounts in 100 millions of yen)

Item \ Year	81	85	88	90	Average Annual Growth Rate		
					85/81	90/85	90/81
Production	1,070	4,779	8,157	10,065	45.4%	16.1%	28.3%
Domestic Demand	—	4,460	6,132	7,844	—	12.0	—
Exports (Percentage)	—	898 (18.8%)	2,822 (34.6%)	3,241 (32.2%)	—	29.3	—
Imports (Percentage)	—	579 (13.0%)	797 (13.0%)	1,020 (13.0%)	—	12.0	—

Office Computers

(Amounts in 100 millions of yen)

Item \ Year	81	85	88	90	Average Annual Growth Rate		
					85/81	90/85	90/81
Production	3,067	7,017	11,667	15,527	23.0%	17.3%	19.8%
Domestic Demand	—	6,369	10,271	13,389	—	16.1	—
Exports (Percentage)	—	648 (9.2%)	1,396 (12.0%)	2,138 (13.8%)	—	27.0	—
Imports (Percentage)	—	—	—	—	—	—	—

Computers And Related Equipment (Overall)

(Amounts in 100 millions of yen)

Item \ Year	81	85	88	90	Average Annual Growth Rate		
					85/81	90/85	90/81
Production	18,821	35,771	54,881	69,943	17.5%	14.4%	15.8%
Domestic Demand	18,939	34,727	50,799	64,455	16.4	13.2	14.6
Exports (Percentage)	1,936 (10.3%)	4,143 (11.6%)	7,863 (14.3%)	11,034 (15.8%)	21.0	21.7	21.4
Imports (Percentage)	2,054 (10.8%)	3,099 (8.7%)	3,781 (7.4%)	5,547 (8.6%)	10.9	12.4	11.7

NATIONWIDE ONLINE CREDIT CARD SYSTEM

In Japan, credit authorization checks are carried out between individual retail stores, for instance, and each of the various credit agencies on a one-to-one basis by telephone or something. Therefore, granting that retailers install terminal at their stores connecting to the agencies' computer centers, they literally have to have a different terminal for each type of credit card they handle.

Accordingly, there are some plans for the integration of credit checking systems to enable stores and restaurants to carry out credit checks on all the different types of cards they handle using a single terminal. This nationwide credit network system would also make it possible for participating stores to automatically process their credit sales information, and for the credit companies themselves to manage their business information automatically.

At present, there are two plans for the system, the Credit And Finance Information Switching System (CAFIS) developed by the Nippon Telegraph and Telephone Public Corporation (NTT) and the Credit Authorization Terminal Network (CATNET) developed by IBM, Japan, with those credit card companies affiliated with financial institutions submitting proposals in favor of CAFIS, and those credit card firms affiliated with the credit sales agencies offering proposals in favor of CATNET.

COMPUTER INSTALLATION IN JAPAN

– As of the End of December, 1982 –

General Purpose Computers in Operation

(Value: million yen)

Size of Computers		End of December, 1982	End of September, 1982
Large	Set (%)	3,805 (3.1)	3,652 (3.1)
	Value (%)	2,918,799 (56.0)	2,799,163 (56.2)
Medium	Set (%)	12,381 (10.1)	11,852 (10.2)
	Value (%)	1,215,500 (23.3)	1,163,257 (23.3)
Small	Set (%)	37,308 (30.6)	35,463 (30.6)
	Value (%)	677,161 (13.0)	644,528 (12.9)
Very Small	Set (%)	68,510 (56.2)	65,037 (56.1)
	Value (%)	401,737 (7.7)	382,008 (7.7)
Total	Set (%)	122,004 (100.0)	116,004 (100.0)
	Value (%)	5,213,197 (100.0)	4,988,956 (100.0)

Notes 1. The characteristics of computers covered by the current survey include:
(1) Digital type computers
(2) Stored program computers
(3) Main memory of 2,000 bits or more
(4) Computing structure based on electronic logical computation

2. Standards for computer classification by scale in terms of purchase price

Classification	Purchase price
Large	More than ¥250 million
Medium	¥40–¥250 million
Small	¥10–¥40 million
Very small	Less than ¥10 million

Computer Use by Industry
(End of December, 1982)

(Value: million yen)

Industrial Category	Set	Value	Value per set
Agriculture	108	2,914	27.0
Forestry and hunting	66	742	11.2
Fisheries, fishing and pisciculture	209	4,093	19.6
Mining	158	4,832	30.6
Construction	2,756	67,610	24.5
Foodstuffs	3,826	88,080	23.0
Textiles and textile products	2,398	53,906	22.5
Pulp, paper and paper products	927	18,641	20.1
Publishing and printing	1,106	48,487	43.8
Chemicals and petroleum refining	4,137	193,786	46.8
Ceramics	953	32,122	33.7
Iron and steel	1,169	147,665	126.3
Non-ferrous metal	1,990	66,392	33.4
Machinery	2,448	94,509	38.6
Electric machinery	5,142	599,984	116.7
Transport equipment	1,990	224,897	113.0
Precision machinery	1,005	50,318	50.1
Other manufacturing	4,154	87,929	21.2
Wholesale and retail, trade firms	53,907	800,097	14.8
Finance	6,687	753,821	112.7
Security	313	75,370	240.8
Insurance	804	162,246	201.8
Real estate	329	5,717	17.4
Transportation, and telecommunications	3,809	136,244	35.8
Electricity, gas and water	539	74,867	138.9
Service	9,851	432,493	43.9
(General Service)	5,200	126,665	24.4
(DP Service)	4,651	305,828	65.8
Hospitals	935	29,208	31.2
Universities	1,196	145,116	121.3
Senior high schools	520	10,640	20.5
Other schools	363	11,926	32.9
Municipal bodies	1,702	120,912	71.0
Government department agencies	814	148,916	182.9
Governmental organizations	1,148	373,318	325.2
Cooperative association and organizations	4,392	139,040	31.7
Religious organizations	43	1,169	27.2
Not elsewhere classified	110	5,189	47.2
Total	122,004	5,213,197	42.7

UPCOMING EVENTS IN JAPAN
1984

DATE	EVENT	CITY/PLACE	ORGANIZER/CONTACT
January 25-28	13th Internepson Japan/Semiconductor Exhibition	Kokusai Mihon-ichi Kaijo, Tokyo	CEG Japan, No. 3 Hino Bldg. 3-4-11, Uchikanda, Chiyoda-ku, Tokyo 101 (03) 254-6041
February 16-18	5th Electro-optics/ Laser Exhibition	Tokyo Ryutsu Center, Tokyo	CEG Japan, No. 3 Hino Bldg. 3-4-11, Uchikanda, Chiyoda-ku, Tokyo 101 (03) 254-6041
22-24	'84 Office Automation Show	Kokusai Mihon-ichi Kaijo, Tokyo	Nippon Administrative Management Association 1-8-4, Utsubohonmachi, Nishi-ku, Osaka 550 (06) 443-6961
April 3-6	Communication Tokyo '84	Tokyo Ryutsu Center, Tokyo	Communication Industries Association of Japan Sankei Bldg. Annex, 1-7-2, Otemachi, Chiyoda-ku Tokyo 100 (03) 231-3156
17-19	OA Show Kansai	Osaka Minato Kaijo, Osaka	OA Show Kansai Nihon Keizai Shimbun 1-1, Kyobashi Maenocho Higashi-ku, Osaka 540 (06) 943-7111
May 21-23	The 3rd International Microelectronics Conference	Keio Plaza Hotel, Tokyo	Mr. Hisao Hirabayashi ISHM JAPAN 5-635 Hanakoganei, Kodaira, Tokyo 187 (0424) 67-7602
23-26	Micro Computer Show '84	Tokyo Ryutsu Center, Tokyo	Japan Electronics Industry Development Association 3-5-8, Shibakoen, Minato-ku, Tokyo 105 (03) 434-8211 Ext 352
23-26	Business Show	Kokusai Mihon-ichi Kaijo, Tokyo	Nippon Administrative Management Association 4-1-13, Sendagaya Shibuya-ku, Tokyo 151 Tel: (03) 403-8910
June 11-13	World Computing Services Industry Congress IV	Keio Plaza Hotel, Tokyo	JSIA/JIPCA Kikai-Shinko-kaikan Bldg., Room 406-2, 5-8, Shibakoen 3-chome, Minato-ku, Tokyo 105 (03) 436-3938
27-30	Micro Computer Show '84 Osaka	Osaka Kokusai Mihon-ichi Minato Kaijo, Osaka	Japan Electronic Industry Development Association 3-5-8, Shibakoen, Minato-ku, Tokyo 105 (03) 434-8211 Ext 352
July 2-5	'84, Osaka Automation Show	Tokyo Ryutsu Center, Tokyo	Enterprise Project Bureau Nihon Keizai Shimbun 1-9-5 Otemachi, Chiyoda-ku, Tokyo 100 (03) 270-0251
September 26-29	Data Show '84	Harumi Tenjijo Tokyo	Japan Electronics Industry Development Association 3-5-8, Shibakoen, Minato-ku, Tokyo 105 (03) 434-8211 Ext 352
November 6-9	International Conference on Fifth Generation Computer Systems	Keio Plaza Hotel Tokyo	FGCS '84 Secretariat Institute for New Generation Computer Technology Mita Kokusai Bldg. 21F 1-4-28 Mita, Minato-ku, Tokyo 108 Japan Tel: (03) 456-3195 Telex: 32964 ICOT

Japan Information Processing Development Center