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# Japan Computer Quarterly



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in Japan

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Publisher: Eiji Kageyama, President

Editor: Yuji Yamadori, Director  
Research & International  
Affairs

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No. 90



## From the Editor

Today, informatization is a vital factor in the growth of industry and society in Japan and other major industrial countries. The remarkable developments in information and telecommunications technology have been widely and deeply reflected in the informatization of industry, including small businesses as well as large corporations, and in the informatization of society, daily life and individuals. At the same time, improvements in information and communication equipment functions, reductions in cost, the consolidation of information and telecommunication infrastructures including ISDN, and other developments in recent years have been bringing about a rapid expansion of information and telecommunication networks, from intra-business to inter-business, from intra-industry to inter-industry and from intra-regional to inter-regional or international networks.

People gather wherever there is information. And as people gather in such places, the volume of information swells. A recent national census shows that about 26% of Japan's total population is concentrated in the Tokyo metropolitan area. According to a survey by the Ministry of Posts and Telecommunications, the Tokyo Metropolitan area accounts for about 35% of the total volume of information supplied, such as by mail, telephone, TV, newspapers and conversation. This phenomena is due primarily to the fact that national government agencies, business head offices, colleges and universities,

research institutes and other information transmitting organs are concentrated in Tokyo.

Based on unique indicators, JIPDEC does a yearly survey of the informatization of industry and regions of Japan in the three main fields of hardware, software and telecommunications. In this survey, regional informatization is analyzed in terms of informatization equipment ratios based on the value of the hardware and software held per company and the telecommunications capability per company (bps/company) in each region. The results of analysis show that the Kanto area, centering on Tokyo, is in an overwhelmingly dominant position in each of these three fields, followed by the Kansai area centering on Osaka. With respect to the software equipment ratio, for example, the ratio for the Kanto area is 4.5 times higher than the ratio for the Shikoku area, which is close to the Kansai economic bloc and has been rapidly informatizing in recent years, partly as a result of the completion of an overland route to Kansai. As this example shows, informatization is concentrating in large cities in Kanto, Kansai and a few other areas, causing a very large informatization differential from the rest of country's regions. The survey projects that this trend will continue for some time to come. It may be worthy to note in this connection that Tokyo and Osaka account for a total of 52% of all the general purpose computers installed in Japan and 67% of total information service

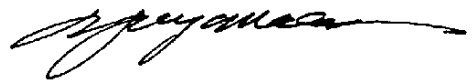
industry sales. In particular, Tokyo accounts for more than 80% of total sales in the data service industry.

Japan urgently needs to redress the existing informatization differential in order to move forward toward the realization of a sound, well-balanced information society. In various regions, local governments and local economic circles are now taking the lead in seriously working out technopolis plans, regional development projects, and so forth. Under these circumstances, a great deal of expectation is being placed on the progress of regional informatization, since this is of vital importance for attaining the goal of creating affluent regions that are comfortable to live in. At present, however, most businesses in such regions are small companies. Although they have a strong need to streamline and improve their business processing through informatization, they are still far less advanced than large companies in networking and other respects.

Regrettably, regional informatization is plagued with such problems as small units of demand, a shortage of necessary personnel, and a lack of funds. Therefore, regional development measures by the central government will be absolutely necessary for the correction of the

informatization differential between large cities and provincial areas. In fact, government ministries and agencies are already taking measures to promote regional informatization. It must be noted, however, that such promotion of regional informatization must be based on the formation of a consensus among the parties concerned in each region, in order to meet local needs in the respective fields of industry, society and daily life.

This issue of JCQ describes "regional informatization" from a variety of perspectives, including the promotion of regional informatization in the realm of governmental administration, the regional distribution of the information industry, the construction of regional networks, regional informatization in areas of society such as agriculture, and the informatization of individuals and their private lives in regional terms. We hope this issue will be of use to our readers.



Yuji Yamadori  
Director  
Research & International Affairs

## **Regional Informatization in Japan**

Hiroshi Nakajima  
Senior Staff Writer  
Business News Dept., Editorial Bureau  
Nihon Keizai Shimbun, Inc.





# Chapter 1

## Regional Informatization as Promoted by Governmental Administration

### 1. Regional Projects Led by Central Governmental Offices

#### 1.1 Current State of the Regional Policies of Individual Ministries

National administrative organizations are playing an important role in promoting regional informatization in Japan. The information infrastructure has long been regarded as one of the important factors involved in expanding and improving the industrial and social infrastructure in regions outside the Tokyo area. This has been especially true since the 1980s, when the concentration of population and industry in the Metropolitan area around Tokyo began to worsen. Each ministry has made great efforts to formulate policies for promoting regional informatization. This has stimulated progress in informatization in every area of the country. Regional informatization in these other areas is progressing at a higher speed than in the Metropolitan area.

Many central governmental offices have presented policies for furthering regional informatization. These include the Ministry of International Trade and Industry (MITI), the Ministry of Posts and Telecommunications (MPT), the Ministry of Agriculture, Forestry and Fisheries (MAFF), the Ministry of Home Affairs (MHA), the Ministry of Construction (MC) and the Ministry of Transport (MT).

These policies are implemented according to the following procedure. First, the central governmental office formulates and announces a policy concept describing a "vision" for the future. These concepts have names such as "New Media Community", "High Vision Community", "Teleport" and "Greentopia". Prefectures and municipalities then formulate concrete plans and apply for central government assistance. The central governmental offices concerned examine the proposals and approve plans that meet the requirements. Financial assistance is given to local governments that execute approved plans. However, the form of assistance depends on the "vision". For example, subsidies are provided in some cases and project expenses are financed at low interest rates in other cases.

In more and more cases, these projects incorporate the goal of constructing an informatization infrastructure into overall activities for vitalizing the industry and the society of the various regions instead of merely pursuing the independent development of regional "informatization" as a whole. The trend in this direction has become more pronounced during the past several years. Many of the "visions" that have recently been presented by governmental offices utilize advanced information systems as a core foundation for large-scale new city development whereby specific areas are changed into business districts consisting of multi-storied

buildings, or regional development in which leisure facilities or industrial complexes are constructed. Since such governmental visions involve large investments, they tend to become ministry objectives. Although the visions for the future presented by the different ministries are formulated from different approaches and standpoints, the concrete plans drawn up by the local governments tend to be similar. The regional informatization policies of the central governmental offices are gradually becoming entangled together.

However, since 1987 and 1988 the various "visions" that have triggered awareness of problems relating to regional informatization have had the aim of promoting regional informatization directly (See Table 1).

The first "vision" announced for regional informatization was MITI's "New Media Community Concept". By March, 1992, 85 areas had been designated for implementation of this plan. Under this plan, information systems are constructed and used to increase the competitiveness of small and medium-sized enterprises with deep roots in a region. For example, there are plans to construct advanced telecommunication networks in some regions in order to enable exchange of information between wholesalers, retailers and transport companies and build efficient regional distribution systems. There are plans to construct information systems that manage credit cards which are effective throughout an entire shopping district where the individual stores do not have sufficient funds to implement their own information systems. There are plans to build shopping district guidance systems which give out various kinds of information, for example where clothes are sold and where specific dishes are served, by videotex (character and graphic information network).

In order to implement such plans, a third sector is established jointly by the local government and local enterprises. Some plans have already entered the execution stage.

94 areas have been designated under the "Teletopia Concept", which the MPT announced to compete with the MITI plan, and plans are being promoted steadily by the various local governments. Plans which have already been started include a residential information system, by which the local government sends various kinds of helpful information to residents, and a senior citizens' emergency communication system that enables elderly people who tend to stay at home to request urgent help in case of sudden illness. Like MITI, the MPT has adopted the third sector method, which is established jointly by the local government and local enterprises, in order to implement this "vision".

The MAFF's Greentopia Concept has the aim of directly promoting the informatization of rural areas. The 53 areas that have been designated under this "vision" have plans to construct agricultural information systems using PC networks, CATV and facsimile machines. Depopulation is taking place rapidly in rural areas because the agricultural population is aging, with many young people preferring to live in urban districts rather than becoming a successor to the family farm. Information systems are being constructed in order to keep young people in rural areas and to make up for shortages of information.

Under the "Intelligent City Concept", the MC plans to construct advanced telecommunication systems in various areas to lead the way to urban development. The aim of this project is to construct wide area networks (WAN) with the latest technology under local leadership. As

**Table 1. Major local informatization related projects promoted by ministries and government offices (As of March, 1992)**

Ministries and government offices	Project name	Targeted businesses	Main information systems	No. of planned regions
Ministry of International Trade and Industry	New media community	Informatization related to physical distribution and wholesaling Promotion of local industries Local health and medical treatment Activation of shopping districts Local manpower training Sightseeing information	Local VAN Local network, such as personal computer communications Card system used in shopping districts Science museum system Database system CAI system	85
	Hi-vision community	Introduction of hi-vision related businesses	Optical system, hi-vision related system	28
	Textile resource center	Informatization for improving textile industry structure	Textile database by high density images	5
	Information-oriented future city	City structure based on information system	Satellite communications system, WAN, B-ISDN	9
	Brain site	Activation of local economy by integration of intellectual industries	Shared computers for technological computations Facility control system Shared database	18
Ministry of International Trade and Industry/Ministry of Labor	Development of local software supply capability	Training software engineers	Sigma workstation	12
Ministry of Posts and Telecommunications	Teletopia	Local data communications Local videotex Local CATV Local mobile radio	Residential information system, agricultural information system, personal computer network, telemeter, joint POS system, videotex, and at-home report system for the elderly	94
	Hi-vision city	Introduction of hi-vision	Hi-vision related system, optical system	24
	Utilization of radio waves for the promotion of local communities	Development of new forms of radio wave use	Resort radio system Parking lot guide system	-
	Telecom town	Distribution of major enterprises into local districts and integration of local industries	Satellite communications system, WAN Local IC card system	-
	Teleport	Improvement of city functions	Satellite communications system, WAN, B-ISDN	1
Ministry of Agriculture, Forestry and Fisheries	Greentopia (designated by 1988)	Agriculture-related information communications	Personal computer network, weather telemeter, facsimile, CATV	53
Ministry of Home Affairs	Satellite communications network	Joint satellite network of local governments	Satellite related system Local network system	1,131
	Development of local information network	Informatization of wide-area communities	Public facility guide system Library information network IC card system	6
Ministry of Construction	Development of new city bases	Development of advanced city functions on old National Railway sites	Building control system Parking lot system POS system Local IC card system	17
	General local generation city	Development of new types of local cities	Buildings control system WAN, B-ISDN	11
	Intelligent city	Development of advanced information communications bases for cities	Buildings control system B-ISDN, WAN	53
	Development of a parking lot guide system	Development of parking lots and improvement of guide facilities	Guide display system Card system, POS system	26
Ministry of Transport	Physical distribution network city	Informatization of physical distribution, commercial distribution, and sightseeing functions	Local VAN, joint distribution system	15

Note : "-" in the number of planned areas column means that those projects are in the research stage.

The development of new city bases project and the general local generation city project under the Ministry of Construction will be integrated as the "general development of city bases" project in 1992.

Source : JIPDEC

soon as they move into such areas with their OA equipment and computers, companies and individuals will be able to exchange information with destinations both inside and outside the area by advanced digital communications. The MC's "Parking Place Guidance System Construction Project" has a more regional nature. Many families drive to the central locations of their regional area on holidays, but find it difficult to find vacant parking places. This kind of information system will show drivers where vacant parking places are currently available ahead of time, before they go into the central area. This project is being implemented in various locations throughout the country.

Although it is true that these "visions" that have been proposed by the ministries and agencies encourage local governments, there is a problem in that the contents of these "visions" are similar.

All these information systems use videotex, PC communications, CATV, facsimile, satellite communications, LAN (Local Area Network), WAN, IC cards and databases, and they are used for similar applications, such as the shopping district guidance system, customer management systems and residential information systems. For this reason, some areas have applied for both the MITI New Media Community and the MPT Teletopia and have been designated under the two similar projects. However, it is also true that regional informatization is being accelerated by competition between the central governmental offices.

On the other hand, it is difficult for local governments to formulate creative, original proposals for presentation to the central government offices. Think tanks or consulting companies in large cities are often asked to prepare

their proposals because the local governments lack the necessary know-how. As a result, many of the proposals presented by the local governments have great similarity. This is the reason why the regional informatization projects promoted under the leadership of central governmental offices, regardless of location, tend to have a common structure.

## **1.2 Promotion of Informatization by Local Governments**

The local governments are the governmental offices that are directly engaged in regional informatization. Although the central governmental offices take indirect action, it is the local governments that take the concrete actions to further regional informatization. Rapid informatization is taking place in local governments services for residents through the use of computers, communications, and satellites. Informatization has made remarkable progress in areas such as disaster prevention, traffic, libraries, and museums, especially during the past few years.

The community network construction concept offers great potential for improving convenience for local area residents. Under the MHA's leadership, three standard network systems are being developed for the whole country: a regional card system under which residents can use only one card to do everything in their daily lives anywhere within their area, a library information network system and a public facilities reservation and guidance system.

A regional card system uses resident IC cards for managing health information, such as medical checkup data, issuing resident cards, personal identification at libraries, and recording personal history information. This project

is in progress in five municipalities (Yonezawa-shi in Yamagata, Kitaibaraki-shi in Ibaraki, Hiyoshi-cho in Kyoto, Okayama-shi in Okayama and Nariwa-cho in Okayama) designated since fiscal 1991.

The purpose of a library information network system is to promote the use of libraries as regional information sources in order to increase lifetime education opportunities for local residents and to support company R&D activities. As Japanese society ages, lifetime education is becoming essential for residents who are planning the second phase of their lives. Also, lifetime education is important for women who want to participate in activities in society after raising their children. Small and medium-sized local companies need to collect the latest information about frontier technologies, market trends and foreign countries related to their area of business interest. Libraries will play an increasingly important role as the sources of such information. They must offer not only cultural information, but also social and industrial information that is useful for practical purposes.

Up until now, individual libraries have established efficient lending systems, but the network system will connect a number of libraries by communication lines to construct a more advanced system. It will have a multi-layer database structure, so that a specific book can be looked for by searching the database of the local library as a first step, and then extending the scope of retrieval to libraries in adjacent areas, to the libraries in the same prefecture, and finally to libraries throughout the country. Such networks will also be important for quickly collecting social and industrial information of a practical value. The project was started in fiscal 1991 by five groups (Kitami-shi in Hokkaido,

Aomori, City Wide Area Administration Council of North Tama in Tokyo, Yamanashi and Sasebo-shi in Nagasaki).

The aim of a public facilities guidance and reservation system is to centralize the management of the various public services available to local residents. Information about various facilities, systems, events and personnel resources currently managed separately by different departments and extra-departmental organizations of public organizations will be stored in one database. When inquiries are made, information will be given out by telephone, facsimile or personal computer communications. Reservations can be made from the home through terminals. This project was started in six municipalities (Katsuta-shi in Ibaraki, Koshigaya-shi in Saitama, Akikawa-shi in Tokyo, Matsumoto-shi in Nagano, Amagasaki-shi in Hyogo and Imabari-shi in Ehime) in fiscal 1991.

The Local Government Satellite Communications Corporation, founded in February, 1990, is engaged in the preparation of a regional satellite communications network. Operations were started in Tokyo, Toyama and Hyogo in December, 1991. One of its objectives is to strengthen radio communications for prefectural disaster prevention administration, because sufficient information cannot be collected and transmitted at present because of a shortage of lines. Another objective is to facilitate exchange of information between the central office and branch offices of the prefecture and between the prefecture and municipalities. Another project in planning is a regional video information transmission project which introduces local government events, lectures, and cases of regional community improvements to the whole country. Ground stations for this network are

being constructed in 18 prefectures, including Tokyo and 1,131 municipalities.

There is an increasing interest in applying advanced electronic information technology to art galleries and museums that local residents can access easily. An image software system has been developed to clearly reproduce works of art by HDTV. The HDTV Museum Promo-

tion Council was organized in March, 1991. Their first project was to record works of 19th century French art in the collections of 27 museums in Japan as HDTV still pictures. This was named "19th Century French Art Available in Japan" (with 20 titles in total). There are 501 members of this council, consisting of 1 national museum, 444 local governments and 56 private art galleries and museums.

## Chapter 2

# Impact of the Advance of Information Enterprises into Regions

### 2.1 Dispersion of Information Industry to Outlying Regions

In considering the factors contributing to the promotion of regional informatization, the active regional advancement of private enterprise must be taken into account in addition to the regional promotion policies of governmental offices. In particular, we should not forget the importance of the role played by the software development sector of the computer industry. Computer companies are rapidly extending their business activities into outlying regions, partly because local governments give them preferential treatment; since this is regarded as the most effective way to promote regional industry. Computer enterprises are also advancing into these regions partly to obtain system construction orders from the local financial and distribution industries and local governments. At the same time, they intend to establish personnel employment channels for many years to come by deeply rooting themselves in regions where a large number of capable people are still available. This is an important strategy for solving the chronic shortage of software engineers. Regardless of their motivation, computer enterprises which extend their business activities into regions outside the Metropolitan area raise regional awareness about informatization and produce and sometimes spin off educated and trained workers. As a result, new enter-

prise groups centering around computer technology have been born in various areas, forming a foundation for promoting regional informatization.

In addition to the ordinary information systems business expected from local governments, one incentive that drives computer companies into these regions is the regional informatization projects that are being planned and executed by local government under the regional informatization "vision" plans of central governmental offices. The computer companies are interested in receiving orders for new types of information systems from local governments. Most of the projects ordered by local governments have the same basic structure, so an enterprise that receives an order from one local government can apply the same know-how and developed software to another local government's project. In this way, they can obtain an advantage over the competition and enjoy a high profit ratio, through lowering development costs.

In choosing a company, the local government considers not only company know-how, but also company contributions to the local area. Therefore, companies must expand their business activities into the region in order to make contributions in terms of both employment and tax payments. Japanese hardware manufacturers have realized this from early

on, and have steadily made regional progress. This trend has even been spreading among foreign affiliated manufacturers and medium standing software houses during the last 2 or 3 years. The dispersion of the computer industry, which has extended informatization from large cities to various parts of the country, has been one of the driving forces promoting regional informatization.

The environmental differences in software development work between large cities and outlying regions will become smaller along with the expansion of NTT's Integrated Service Digital Network (ISDN), which will be completed in 2015. Owing to the development of digital communication lines, when software is developed using a host computer and terminals connected by these communication lines, the actual location of the terminals will be of no importance. In some cases, it is more advantageous to perform software development work in regions where housing expenses and living expenses are lower. Regional informatization will progress rapidly as large numbers of computer engineers are educated in outlying regions or move to outlying regions.

## **2.2 Regional Advancement of Hardware Manufacturers**

In order to promote regional informatization, it will be important to raise people in all parts of the country who have studied information technology and who are familiar with information equipment. The regional advancement of companies in search of bases for software development has had the effect of stopping the flow of new graduates to the cities, and has encouraged information engineers to return from cities to their home regions. These people form the nucleus for regional informatization.

In December, 1991, IBM Japan announced a large-scale organizational reform by which they changed their marketing system, which had been organized by customer, and shifted to the new system starting in January, 1992. One of the major points of this organizational reform is a regional policy that emphasizes receiving orders for regional information system projects and extending system development (system engineering) companies into various regions. IBM Japan established 11 local system companies in 1991 in order to raise system development capability, because the importance of this for competitiveness is increasing. They plan to promote regional development even more positively in 1992.

It should be noted that foreign affiliated computer enterprises started to make inroads into outlying regions in 1991. For example, Nihon Unisys established software development companies in Nagoya and Yokohama, while Japan Olivetti established similar companies in Nagano and Okinawa. These foreign affiliated enterprises pursue regional advancement by making joint investments with local capitalists engaged in multi-lateral businesses. This has the effect of quickly motivating powerful local medium-standing enterprises to take action towards informatization.

Japanese hardware manufacturers like Fujitsu and NEC already have system development bases throughout the country, ranging from Hokkaido in the north to Okinawa in the south. Fujitsu is shifting their emphasis from the establishment of new subsidiaries to the improvement of development personnel at their existing subsidiaries. Functioning as a component of the software development division of the whole enterprise, some of the subsidiar-



ies are assigned to specific software fields like basic software, communication software, financial software or CAD (Computer Aided Design) software. In this way, specific software technologies are strategically developed at these subsidiaries.

Competition to obtain information engineers in those regions is being intensified by the regional development of foreign affiliated companies, which had been lagging behind. At the same time, this regional development accelerates the transfer and infiltration of information technology into the regions. It revitalizes the personnel market through competition to obtain the available software engineers (See Table 2).

The chronic shortage of software development personnel partly accounts for the reason why computer enterprises started to strengthen their system development capabilities in non-

Metropolitan regions. In Japan, it is anticipated that there will be a shortage of about 1 million software development engineers by around 2000. Hardware products like computers, workstations and personal computers are quickly becoming compact and inexpensive, owing to the progress in semiconductor technology and mass production. In contrast, the productivity of software development technology is not improving that quickly. There may not be enough software available for the large volume of hardware available on the market. The Japanese birth population rose above 2 million during the 1970s, but began to decrease rapidly after that. It fell to nearly 1.2 million between the late 1980s and 1990. There will inevitably be a serious shortage of young workers around 2000, when the babies born during this period have grown up. The software development industry, which has a strongly labor-intensive nature, will be obliged to implement additional measures in

**Table 2. Software house development by computer companies**

Company name	No. of software houses	Total number of persons in charge of development	Representative company
Fujitsu	63	15,000	Fujitsu Aomori System Engineering
NEC	24	11,900	Okinawa NEC Software
Hitachi	27	32,500	Hitachi Tohoku Software
Toshiba	26	—	Toshiba Hokkaido System Development
Mitsubishi Electric	6	2,000	Mitsubishi Electric Eastern Computer System
Oki Electric	17	2,800	Oki System Development Niigata
IBM Japan	43	—	Solution Lab. Chubu
Nihon Unisys	20	1,950	Toyota Soft Engineering
Olivetti Japan	2	50	Olivetti Asahi
Uchida Yoko	13	600	KIT (Hiroshima)
Fuji Xerox	1	350	Fuji Xerox Information System
Ricoh	4	150	Ricoh System Development Kitami

Note : The figure for Hitachi includes sales staffs.

Source : JIPDEC

order to obtain human resources in outlying regions.

Computer enterprises are also expanding into outlying regions to obtain orders for various regional systems, not just to make up for the serious shortage of software development engineers. They anticipate a large demand for advanced, sophisticated local government systems and regional systems operated by agricultural cooperative associations, credit unions, the local distribution industry, and transport companies.

Foreign affiliated enterprises tend to establish system development companies jointly with powerful local enterprises, in contrast to Japanese manufacturers, which tend to establish local subsidiaries through 100% investment. Since foreign affiliated computer enterprises have limited ability to penetrate local governments and local enterprises, they try to strengthen their market forces by taking advantage of local confidence in their partner enterprises. The local enterprises which become their partners can raise their system development capabilities through the transfer of information technology. This plays a significant role in promoting regional informatization through spontaneous local ideas.

Some local governments construct "software industry complexes" in recognition of their effect on the promotion of local industry, and make great efforts to attract system development companies by providing incentives like preferential tax treatment. The software development industry is expected to be a key to regional promotion, as it creates great employment opportunities and has a large growth potential. The fact that the software develop-

ment industry is a clean, pollution-free industry is another factor that accounts for local enthusiasm.

However, some companies that expand their business activities into these regions are criticized because they employ a large number of engineers graduating from local universities or professional schools, but then send them off to software development bases in large cities like Tokyo and Osaka on the pretext of "training" them. Those who graduated from local schools and preferred local employment and those who returned to their home towns from cities in order to live with their parents feel deceived. In such cases, the local economic effect is not as large as expected. In order to avoid such criticism, it is important for computer enterprises to clarify their attitude relating to their business expansion into outlying regions. The participation of foreign affiliated enterprises in the regional market induces these pioneering enterprises to correct their attitude, and to send trained engineers back to the local regions and have them work as the leaders of regional informatization.

### **2.3 Regional Advancement of Software Enterprises**

It is not just computer hardware manufacturers that are stimulating the improvement and accumulation of information technology in outlying regions. The advance of software companies is also having an effect. Software companies, which face a more serious shortage of software development engineers than hardware manufacturers, are increasing the speed of their regional development for the sake of survival. During the last few years, software enterprises are listing stocks or beginning to publicly offer over-the-counter

stocks at an increasingly rapid pace. Some make public offerings in order to become known more widely or to improve their regional reputation.

Unlike computer hardware manufacturers, software companies usually establish marketing bases in the form of branch offices or stores instead of by establishing subsidiaries. This method is adopted in order to clearly exhibit their business presence when starting to publicly offer stocks. Some companies have absorbed regional subsidiaries and changed them into branch offices. Many of these will be changed back into subsidiaries later. Medium standing software companies grow at a high speed, so their ability to absorb labor will increase and their role in transferring information technology to outlying regions will become more and more important as they grow.

Compared with the nationally known hardware companies, software companies lag behind both in reputation and public confidence. In order to compete with hardware enterprises, some software enterprises employ unique ideas in recruiting workers and expanding business in outlying regions.

The Core Corporation, a certain large software development company, is adopting a typical strategy. This enterprise established system houses that develop systems by combining hardware and software in 6 locations, including Hokkaido, Chubu, Kansai and Kyushu. They established a Hokkaido Eastern Area Information Center jointly with Bihoro-shi in Hokkaido, a Tohoku Information Center with municipalities near Mogami in Yamagata, and a Koga City Information Center with Koga-shi in Ibaraki through participation in regional

advanced informatization projects promoted by local governments through the third sector method. They are promoting regional informatization by directly participating in the informatization projects of local governments.

Core Corp. established software development bases as in-house sections in a total of 38 locations: kernel cities like Obihiro, Sapporo, Sendai, Akita, Shinjo, Koriyama, Oomika, Fujisawa, Fukui, Kyoto, Matsuyama, Hiroshima, Ootake, Izumo and Karatsu, and in even smaller local cities. The objective of this strategy is not only to obtain local labor, but also to participate in various regional informatization projects. Core Corp. is beginning to assume a central role in the actual promotion of regional informatization in cooperation with administrative organizations.

Another unique method adopted by this company is to open professional computer schools in local cities, where they educate future workers themselves. They have schools in ten areas: Bihoro-cho and Obihiro-shi in Hokkaido, Akita-shi, Shinjo-shi in Yamagata, Koga-shi in Ibaraki, Tokyo, Iida-shi in Nagano, Hikawa-cho in Shimane, Yamaguchi-shi, Karatsu-shi in Saga and Miyakonojo-shi in Miyazaki. A large number of the information engineers educated at these schools will be employed as information engineers by local non-information enterprises, not only by this company. These people are expected to promote the informatization of local medium standing and smaller enterprises and industries.

Some large manufacturers have re-educated all employees at local establishments into software development engineers as a part of

rationalization measures. For example, Nippon Steel employed this method in Muroran, Kamaishi and Yawata. Large manufacturers regard the software development industry as the most promising field to enter into as a part of their business strategy leading up to the 21st century, and are steadily taking actions toward business conversion. The chimneys

that symbolized the industrial city will be replaced by offices where terminals and workstations used for software development are installed on desks. The large number of workers who acquire information technology skills will then promote the various informatization projects proposed by local governments.

# Chapter 3

## Inter-enterprise Networks Promote Regional Informatization

### 3.1 On-line Networks Used by Large Enterprises for Order Issuance and by Banks for "Firm Banking"

The informatization of locally rooted smaller enterprises is promoted in part by the enhancement of their business partners' information systems. Even medium standing and smaller enterprises which operate mainly in outlying regions are no exception, in that informatization is necessary for their survival. However, the development of on-line transaction systems which involve business partners is not a favorable phenomenon in all respects. When an assembly manufacturer has strong control over its subcontractors, the construction of an on-line transaction system between them sometimes forces the latter to make frequent small-quantity deliveries in accordance with the former's orders. Some point out that such a phenomenon can bring about a distorted economic system in which the power relations between enterprises are excessively exaggerated.

Standards for EDI (Electronic Data Interchange), which supports the exchange of information between different industry groups, are being established under MITI leadership. Without doubt, business transaction information will be exchanged on-line over communication lines in the future instead of by the previous method of handling vouchers. It is

also certain that regional informatization will progress rapidly in spite of the problems involved.

### 3.2 Ordering and Order-taking Networks

"Partner companies" which deliver parts to large automobile, electrical equipment or machinery manufacturers, directly receive order information, such as the types and quantities of parts to be delivered the next day, by computer via communication lines in the on-line mode. Under the conventional "just-in-time" inventory system, truck drivers physically obtained order information by picking up order slips when they went to the plant to deliver parts. Therefore, the subcontractors were unable to obtain the order information until the evening, when the trucks came back. The complexity of these operations has been reduced remarkably by changing to the on-line electronic "just-in-time" system. At the same time, the efficiency of assembly manufacturers has risen enormously because the new system shortens the time between ordering and delivery.

In response to assembly manufacturer demands, many partner companies are actively constructing on-line order receiving systems using office computers and personal computers and CIM (Computer Integrated Manufactur-

ing) systems, which connect the order receiving system to production lines. Nissan Motor sends the CAD (Computer Aided Design) data of the parts they need on-line in order to promote the rationalization of development processes at partner plants. Such systems have eliminated various obstacles. For example, the assembly manufacturer which gives the orders no longer has to output drawings or draw up vouchers. The partner company which receives the orders no longer needs to draw up vouchers and design products in a duplication of the assembly manufacturer's efforts. This remarkably shortens the time between ordering and delivery and reduces expenses for both parties. Also, the assembly manufacturer's competitiveness is increased by shortening the development period and delivery time.

However, after the introduction of an on-line ordering system, many assembly manufacturers tend to frequently issue orders to their partner companies, whenever the need arises. As a result, the delivery operations of the parts manufacturers become inefficient because they must frequently make small-quantity deliveries, operating large trucks loaded with only a few parts. The excesses of the just-in-time method have been severely criticized in view of this waste of energy and labor, and the harmful effect on the environment.

A similar problem is occurring with the frequent deliveries that some convenience stores demand of their partner companies, to the point that it has become a social problem. What is important is to study how information systems can give users the merit of reducing the time between ordering and delivery, while at the same time preventing the waste of resources and energy and preventing undesirable influences on the environment.

### 3.3 On-line Transactions with Banks

"Firm banking" is a type of on-line information system by which customer enterprises can perform transactions with banks, such as money transfers and inquiries about deposits and payments. This service enables customers to make payments to their business partners without going to the bank, simply by operating a terminal at their office. They can check the schedule for the settlement of bills and shift surplus funds from ordinary deposits to more advantageous time deposits or various bonds. By performing these operations without going to the bank, companies can save time. As a financial system with strong ties to the local area, the use of such systems is spreading to smaller enterprises. Most large city banks and local banks already have constructed this kind of system. Smaller financial institutions with strong local affiliations, like credit unions, have been lagging behind in informatization investments, but are quickly making preparations to institute firm banking.

There are multiple levels of firm banking services: telephone, facsimile, personal computer communications and single-purpose firm banking terminals. Firm banking terminals with a large liquid crystal displays that can display a large number of characters have become available. Since they have many functions in spite of their low cost, their use is spreading rapidly. According to a survey by the Center for Financial Industry Information Systems (Japan) in February, 1991, firm banking terminals are used at 23.6% (nearly a quarter) of the financial institutions throughout the country, and personal computer services have been adopted at 30.4%.

Home banking, which provides similar services through single-purpose terminals installed

in the home, is offered by 14.6% of the financial institutions. However, only about 22 thousand home banking terminals are in use, and their dissemination is not progressing. This is partly because the simple machines used as home banking terminals are similar to game computers and are not viewed as sufficiently reliable for handling large sums of money. However, rapid dissemination of home banking will begin if good software becomes available and telephone terminals with large liquid crystal displays begin to be installed in homes.

Bank POS, which enables users to do their shopping using their bank cash card, is spreading from local banks to credit unions. The total shopping charges are transferred directly from the customer's bank account to the store's account by inputting information from a terminal installed at the store. More than 100 financial institutions started offering this service in 1991. In many cases, two local banks (for example, Akita Bank and Ugo Bank) or a local bank and a credit union have started this service jointly, in order to decrease the informatization investment burden. Even

workers' credit unions and agricultural cooperative societies have joined these services in some cases. A customer carrying no cash can withdraw the amount of a purchase directly from his savings account. Unlike a credit card, bank POS ensures sound consumer finances by limiting purchases to the balance in the savings account. The range of users of this service is expanding, from specialty stores and local shopping districts to gasoline stations, golf courses and other service and leisure facilities (See Table 3).

Activities to institute "Overall POS Card" services that will replace bank POS services have been widely observed since 1991. This is a new type of service that combines the functions of credit cards, bank POS, prepaid cards and a point system that assures a fixed ratio return based on the purchase amount. The merits of bank POS are no longer enough to attract users, because since the beginning of Sunday banking, cash can now be withdrawn from bank accounts on Sundays and holidays. Therefore, the aim of the Overall POS Card system is to double the attractiveness of cards by providing more comprehensive services.

**Table 3. Situation of bank POS execution**

(As of the end of December, 1990)

	Total	City bank	Local bank	Second local bank association member bank	Credit associations	As of the end of December, 1989 (last time)
No. of financial institutions executed	143	11	36	17	79	31
No. of companies used	5,916	486	2,530	667	2,233	674
No. of branches	9,099	607	3,735	873	3,884	1,183
No. of terminals	10,170	1,075	3,975	1,021	4,099	1,673
No. of contract members	1,092,933	55,412	728,239	69,399	239,883	124,844
No. of monthly use cases	40,799	7,780	23,172	1,178	8,669	19,038

Note : The number of monthly use cases is the number of use cases in December, 1990.

Source : 1992 "White paper on financial information systems"

MITI is promoting this system as a part of its measures to strengthen the competitiveness of shopping districts. In 1991, experiments were started in several places, including five shopping districts in front of Fukui Station and the Sasebo Yonkacho shopping district in Sasebo.

Some shopping districts register the members of their card system in a database and effectively utilize consumer shopping information for their marketing activities. The information obtained at individual stores is of little use, but consumer shopping behavior classi-

fied by day of the week, time zones, income groups, and already-owned goods (clothes, furniture, household electric appliances and cars) can be grasped by collecting the information for an entire shopping district, making it possible to efficiently find promising products to market. Since it is expected that this kind of system will increase sales and reduce costs, movements to introduce these card systems can be seen in various places. Overall POS cards will accelerate the movement to revitalize shopping districts by the use of information systems.



## Chapter 4

# Networks Compete for the Role of Local Information Base

### 4.1 Convenience Stores

Convenience store chains are offering more and more benefits to local residents through their information systems.

In 1991, Seven-Eleven completed the construction of an ISDN (Integrated Services Digital Network) that connects all 4,500 Seven-Eleven stores throughout the country. This network transmits commodity information data inputted from each store at high speed. At the same time, it has created a foundation for transforming Seven-Eleven from a chain of local stores selling daily-life goods into a network of agents providing various network-based services. With 4,500 lines, Seven-Eleven is the largest ISDN user in Japan. The Seven-Eleven store is assuming an increasingly important role as a local information base that provides local public services and various national services through its telecommunications network. For convenience stores, competitiveness now depends on how well they improve their information infrastructure and how many new types of services, they offer to local residents.

In the convenience store industry, Sun Chain and Lawson (affiliated with Daiei), Family Mart (affiliated with Saison), and Yamazaki Daily Store (affiliated with Yamazaki Baking) are steadily extending their range of services

by means of network construction, in competition with Seven-Eleven. Competition between these chains is the driving force for improving the local information infrastructure. Convenience stores are becoming far superior to other providers of network facilities, like gasoline stations and post offices, in terms of the systems they have installed in order to function as local information centers.

Convenience stores are regarded as the nucleus of local informatization because they offer local residents the chance to utilize various information systems in a natural way. Their long operating hours are of great benefit to local residents. For example, three-quarters of the Seven-Eleven stores operate around the clock, so local residents are given the chance to utilize the Seven-Eleven information system 24 hours a day.

Among the services convenience stores provide through their information infrastructure, the service of accepting payments for public utility charges (power, gas etc.) is especially appreciated by customers. Consumers can now pay their public utilities bills, such as electricity bills, gas bills, NTT telephone bills, and KDD international telephone bills at local convenience stores, whereas these payments were previously accepted only at savings and deposit organizations of a highly public nature like banks, credit unions, post offices and

agricultural cooperative societies. About 20% of those who used to pay their electricity bills at the above organizations now pay at convenience stores. This kind of service is expanding rapidly, from large convenience store chains to medium-scale chains. Some local governments are beginning to ask convenience stores to accept water service payments as well. Some convenience stores accept life insurance premiums and applications for motorcycle insurance in addition to public utility charges.

The convenience store accepts payments for public utility charges simply by tracing bar codes printed on the bill using a POS reader installed at the register. The organization to which payment should be made, the person who is making the payment, and the amount of payment are all printed in the form of bar codes. This information is read by the bar code reader, and the information that the payment was completed is transmitted from the terminal to the host computer via the network and sent to the billing organization in the form of a magnetic tape the next day. The money can be transferred quickly and at a low cost by computer and communication line, by replacing the money itself with information.

Consumers obtain numerous advantages from this service. For example, they do not need to wait in line at the cashier, they can make payments even at night when financial institutions are closed, and they can pay their bills anywhere, because there are many convenience stores in both urban and rural areas. Through convenience stores, local residents are beginning to experience the merits of information systems.

It is highly possible that convenience stores

will start accepting other types of payment if agreement is reached about procedures such as the bar code processing method. Payments for taxes, tuition for schools, and newspaper subscriptions are currently made by automatic withdrawal from bank accounts, but may be accepted at convenience stores in the future. Convenience stores may find they can attract customers away from financial institutions by offering discounts using prepaid cards.

Convenience store information systems are not only used for accepting payments for bills. Family Mart is experimenting with a service for reserving and issuing tickets for JR Tokai and All Nippon Airways. They may extend this service gradually to tickets for movies and theaters. There is no reason to doubt that convenience stores will assume a more and more important role as a base for services for local residents through use of information networks.

Another new service available at convenience stores is the public facsimile service called "Message FAX" offered by Yamato Transport (a large door-to-door trucking service company). Terminals for this service are being adopted by more and more chains. Information that can be obtained through this facsimile service includes the results or current scores of local high school baseball team games, the current situation in car races, applicant information from the college entrance examination center, maps showing where vacant taxis can easily be found in amusement districts late at night, and the words and scores of songs the customer wants to sing at a karaoke bar. As these examples show, information needs of a highly personal nature can be met by this facsimile service, and it is rapidly becoming a new means of obtaining such information.

Since facsimile machines are not widely installed in the home, those installed at convenience stores are playing the role of public facsimile machines available to all, as with public telephones. This can be regarded as a service that will be provided during a transitional period, until facsimile machines are installed in most homes. When this transitional period ends, this kind of service may be used to send messages home from other locations. Since convenience stores offer information equipment services around the clock, they are now playing the role of a pioneer in the dissemination of such information equipment, and it will be possible to use these stores to observe how general users make use of such information equipment. Thus, convenience stores will play a valuable role as pilot shops where the usage of such equipment can be surveyed.

To compete with the network strategy of convenience stores, small and medium-sized stores are also moving toward information networking through VAN (Value Added Network) services. In this way, convenience stores are providing a large stimulus to promote regional informatization.

#### **4.2 Information Competition by Gasoline Stations and Post Offices**

Gasoline stations (GS) and post offices are actively competing with convenience stores for the role of the local information base. Both have information networks and are steadily expanding their fields of application.

There are about 58,000 gasoline stations throughout the country, including both those affiliated with petroleum companies like Nippon Oil, Kyodo Oil, Mobile Oil and Idemitsu

Kosan and those having no affiliation. A POS (Point Of Sales) system has been installed at most stations to rationalize business operations. In order to obtain local customers, stations are developing and improving various services implemented through the use of information networks. For example, they are improving customer databases using computers, selling food and miscellaneous goods in addition to gasoline, offering leisure guidance and installing bank ATMs (Automatic Teller Machines).

Linkage of the local stations to the petroleum company via an information network is becoming important. Operation of side-line businesses at gasoline stations was approved in the deregulation of 1989. Since then, competitiveness has depended on combining side businesses with gasoline sales. Petroleum company information networks are now an important way of raising competitiveness. The Showa Shell Sekiyu "RIS" system is typical of the systems started for this purpose. It manages customer information sent from gasoline stations at a computer center. For example, the gasoline station may request the center to send a list of customers who have not come in recently to its personal computer. The gasoline station uses that data for sending direct mail information or for telephone marketing. Such customer lists are used for multi-lateral businesses such as family restaurants built at gasoline stations and for sales of seasonal products such as watermelons and cherries.

However, promotion of gasoline sales alone is not an effective means to lure new customers. Stations are contemplating various new services for their regular customers, such as the sale of theater tickets, airline tickets and reserved JR seats, using information networks.

By connecting their networks to the information networks of large trucking service companies, gasoline stations will probably be able to accept cargo for door-to-door trucking services and store cargo temporarily while the person receiving it is not at home. Gasoline stations will undoubtedly quickly develop strategies to utilize their convenience as drive-in locations in order to provide services to residents as an information base.

There is one public organization which has officially announced that it intends to become a local information base - the post office. There were 24,178 post offices throughout the country as of December, 1991. They plan to circulate information about resort locations, hometowns, and rural areas throughout the country using their network. The goal is to offer window services to other public organizations, such as for issuing resident cards. Although they will be utilizing the postal service system for the time being, their future aim is to expand the role of the post office itself through providing information network services.

The "Hometown Information Service," started in 1991, is a service that provides information about various regions. This information service is implemented through cooperation between post offices and local governments, and provides news about specific regions to those who have some sort of connection to those regions. The local government edits sources of information and sends out various kinds of information, such as information about the activities of alumni associations, activities of persons from the same town, schedules of local festivals and events, and invites people

to become subscribing members through the post office. Although print is still being used as the information medium, electronic media will be used in the future. In March, 1991, the P-SAT system, which sends video information to post offices by satellite communications, was started. The plan is to install receiver sets at post offices to show video tapes of hometown news sent by local governments. Thus, the post offices are making efforts to consolidate their position as a relay station for a large variety of local information.

In the field of public office window services, post offices in some municipalities will start a resident card request service in 1992. However, the implementation of this service has been delayed by the need for coordination between various ministries and agencies. A resident living faraway from the public offices will be able to make a request for his or her resident card from a single-purpose facsimile machine installed at a nearby post office and receive the resident card later by mail. Since providing personal identification at the post office will be difficult, a complicated procedure will have to be followed. This service is one step forward towards the realization of an advanced information society, where things can be done by moving information instead of people. Greater coordination between concerned ministries and agencies must be achieved in order to further improve services for residents through the use of information technology. R&D is needed to develop electronic methods of personal identification so that anyone can easily get a copy of his or her family register, resident card or seal impression certificate and receive other services from anywhere in the country.

## Chapter 5

# Farmers Increase Competitiveness through Informatization

### 5.1 Use of PCs by Farmers and Agricultural Cooperative Associations

Facing various international problems, including strong American demands to open the rice market and the movement toward liberalizing the agricultural product market at the GATT Uruguay Round, Japanese agriculture must search for new ways to acquire international competitiveness. With these circumstances as a backdrop, attention should be directed to "informatization" because it can be utilized as an effective means for rapidly raising the efficiency of Japanese agriculture so that Japan's farmers can compete with producers overseas. New means of telecommunications such as PC communications and facsimile are acquiring an increasingly important role as a means of promoting mutual understanding between farmers and consumers dissatisfied with current agricultural products.

With an awareness of these circumstances, more and more farmers and agricultural cooperative associations are raising the efficiency of agriculture by installing personal computers. Competition with overseas producers is not the only problem farmers face. There is also a serious shortage of successors to take over farms because young people prefer urban industries and are moving away from rural areas. There is an urgent need to make agri-

culture seen more sophisticated by using high tech equipment, such as large computers, personal computers, facsimile machines and satellite information, and to change the image of agriculture to that of a technology-intensive advanced industry.

Up until now, farmers have used personal computers mainly for studying the previous day's prices at vegetable and fruit markets and for totalling sales. However, when statistical data for long-term market price fluctuations is analyzed, it is possible to make a rough prediction of advantageous shipment times and to hasten the growth of crops or adjust the harvest time according to those predictions. Such information is now available from the fresh food distribution information service of the Ministry of Agriculture, Forestry and Fisheries, which uses a large computer. Terminals and facsimile machines specially designed for this service have been available since the fall of 1990, and the necessary improvements have been made so that the ordinary personal computers that some farmers already have can receive information from the service (See Table 4).

Agricultural cooperative associations and agricultural extension stations are using information systems for computing individual farmers' profits, totalling orders received, managing stock, rationalizing other office

**Table 4. Agricultural products market information system**

City, town, or village name	Main body of the business	Media	Operation start time
Tonan-mura, Iwate	Tonan-mura	CATV	March, 1993
Miyoshi-mura, Chiba	Miyoshi-mura	Wire broadcasting telephone	July 26, 1985
Yamagata-mura, Nagano	Yamagata-mura	CATV	January, 1989
Yamaguchi-shi, Yamaguchi Hofu-shi, Yamaguchi Ogori-cho, Yamaguchi	The third sector	Local videotex	October 19, 1986
Kita-Arima-cho, Nagasaki Arie-cho, Nagasaki	Kita-Arima-cho Arie-cho	Broadcast radio Broadcast radio	March 8, 1989 September 1, 1990

Source : The Agricultural Information Use Study Group

work, providing market price information to farmers, diagnosing soil, making entries into farm work diaries and diagnosing farm management. Informatization is progressing in localities where there are leaders with a pioneering spirit. Information systems are being used in more diverse and more sophisticated ways as software is added and improved and the knowledge needed to provide guidance is accumulated. Local governments such as municipalities are beginning to give farmers information about agricultural product markets, agricultural techniques, diseases and pests etc. by CATV (cable television), radio, PC communications and facsimile. There are movements in various areas to construct PC networks in which both farmers and local consumers can participate.

The ways that advanced farmers and agricultural cooperative associations use information equipment is changing, from the internal purpose of "rationalizing office work", to external purposes, namely, "acquiring competitiveness by raising productivity enor-

mously" or "raising competitiveness with regard to other producing districts". In other words, informatization is progressing rapidly, while a qualitative change is taking place, moving towards strategic utilization in addition to conventional utilization. Competition between producing districts started when the main agriculture products of farmers began to change, from rice to vegetables, fruit and livestock. The relations between farmers are changing, from that of "fellows" demanding that the Government raise the price of rice to rivals competing for consumers. As a tool for increasing competitiveness, information systems are inevitably assuming a more and more important role (See Table 5).

Recently, personal computers for agriculture are gradually being used for more strategic purposes such as: (1) Accurate weather forecasting (fair, cloudy, rain, frost, etc.) for the next 24 hours for particular farms based on regional meteorological observations, (2) planning the best times for thinning fruit and fertilization and the best types of fertilizer

Table 5. Agricultural technology information system

City, town, or village name	Main body of the business	Media	Operation start time
Rusutsu-mura, Hokkaido	Rusutsu-mura	Broadcast radio	April, 1991
Shibetsu-cho, Hokkaido	Shibetsu-cho	NTT public line	April, 1994
Tonan-mura, Iwate	Tonan-mura	CATV	March, 1993
Sagae-shi, Yamagata	Sagae-shi	Information center	April 1, 1993
Tatebayashi-shi, Gunma	Tatebayashi-shi	Personal computer communications	February 22, 1990
Kanazawa-shi, Ishikawa	Kanazawa-shi	Personal computer communications	July 1, 1990
Nishi-Yoshino-mura, Nara	Prefecture and city	Facsimile communications network	November 1, 1989
Sekiyo-cho, Tottori	Sekiyo-cho	Broadcast radio	October 1, 1988
Osu-shi, Ehime	Others	Personal computer communications, FAX	March 30, 1991
Uchiko-cho, Ehime	Uchiko-cho	Personal computer communications	April 16, 1989
Kurume-shi, Fukuoka	Others	Personal computer communications, FAX	September, 1990
Arie-cho, Nagasaki	Arie-cho	Broadcast radio	September 1, 1990
Ohno-machi, Oita	Ohno-machi	NTT public line	June 1, 1982
Kitagata-cho, Miyazaki	Kitagata-cho	Information center	April 1, 1991

Source : The Agricultural Information Use Study Group

based on temperature changes within the day and total sunshine, (3) estimating the shipment times and quantities of competitive producing districts by analysing their meteorological information, and calculating the most advantageous shipment time (when the market price will be the highest) and selecting the most advantageous shipment market.

It is becoming possible for farmers to receive information from satellites, not only from PCs. They can regularly receive radio waves from the "Himawari" meteorological satellite and the "NOAA" oceanic and marine meteorological satellite, analyze these signals using a PC, and display the cloud state on the screen. Since they can grasp the movements

of clouds in an area of 500 x 500 m at intervals of about 3 hours, they can predict weather and wind directions accurately. Therefore, they can plan their farming work according to the expected weather. Parabolic antennas for satellites will be seen in many farmers' gardens in the future.

Some local governments have been installing meteorological observation robots in various locations and are broadcasting the observation data from the robots by radio. More and more, advanced farmers receive these broadcasts, make short-term predictions of temperature and humidity changes as well as the weather, and use the information to increase their harvests. Some agricultural cooperative associa-

tions in Hokkaido, Tohoku, Kanto, Nagano and Oita collect detailed meteorological observation data for their regions, analyze it by use of PCs and distribute regional forecasts to members by PC communications. Conventional agriculture is being transformed into high-tech agriculture based on advanced utilization of information systems.

## **5.2 Making More Software Available to Farmers**

The utilization of PCs for agriculture is being promoted through cooperation between the Ministry of Agriculture, Forestry and Fisheries and agricultural cooperative associations, or between the central government, local governments and research institutes affiliated to universities. The largest contribution in this area is being made by advanced farmers led by youthful enthusiasts and private software houses.

It is estimated that more than 15 thousand PCs were installed at farms as of December, 1991. Generally marketed software is used for most of these. Software for agriculture is available from large PC manufacturers like Fujitsu and NEC, livestock companies and associations like the National Federation of Agricultural Cooperative Associations and the Japan Agriculture and Livestock Industry and smaller software houses located in all parts of the country. Those software products meet a large variety of needs, in accordance with actual agricultural conditions.

Agriculture related enterprises, such as manufacturers and vendors of agricultural machinery, implements and materials, are expected to enter the market as PC use spreads more widely among farmers and the software

market expands. It is anticipated that techniques to raise agricultural efficiency will be transferred to the entire agricultural sector through PC software. The installation of PCs and the purchase of software have the effect of spreading advanced agricultural know-how through use of information systems, leading to an agricultural revolution.

There are many engineers in private software enterprises who have learned cost reduction techniques for factories and offices while working for large manufacturers. Some of these engineers have begun to develop agricultural software from the standpoint of combining agriculture with rapidly progressing electronic technologies. They produce unique software that differs completely from the efficiency improvement methods conventionally adopted for agriculture. It may be said that they are attempting to apply the techniques of Japanese industry, known for its high productivity, to agriculture. Various kinds of production know-how developed in the Japanese industrial world, which has the highest standards internationally, is being transferred to the world of agriculture through PC software.

IBC, a software house in Miyazaki, is a good example of this. This company offers software that receives data directly from the meteorological satellite via parabolic antenna and performs image analysis. The same company offers a PC production system that automatically observes air temperature changes in a greenhouse 24 hours a day and implements high productivity cultivation. Thus, this company does not merely sell PC software, it is also proposing new agricultural approaches based on the full utilization of frontier information systems. Software for storing local



proverbs and warnings related to agriculture in a database for quick reference is also available from this company. This is an effort to transmit "the wisdom of farming predecessors" because such knowledge is being lost due to the shortage of successors among farmers. In effect, such companies are promoting an agricultural revolution through the sale of PC software. Private software companies that do not adhere to the conventional agricultural techniques will play an increasingly important role in the informatization of agriculture.

One of the problems of local medium-sized and small software companies is that they do not have enough advertising capability to distribute their products throughout the country. Another problem is that it is difficult to make qualitative assessments of their products to find out, for example, whether the expected performance and functions of the products are accomplished as intended. It is not certain whether these companies have the ability to take full responsibility for maintenance of their products, for future functional enhancement and for debugging (eliminating errors in programs). In other words, a means must be found to promote the distribution of such PC software among a wide range of users without burdening the users with worries about quality and maintenance problems.

### **5.3 Possibilities for "Direct Electronic Shipment from Producing Districts"**

Various attempts using PCs, facsimile machines and telephones have been started to implement "New Approaches to Consumers", one of the pending problems of agriculture. Domestic farmers have an advantage over foreign farmers in that they can more easily

communicate with consumers. However, farmers will be unable to take note of changes in consumer attitudes if they continue to depend on indirect communications with consumers by distributing rice through the Ministry of Agriculture, Forestry and Fisheries and distributing other agricultural products through large agricultural cooperative associations. Farmers must have a means to sell their products directly to consumers. Negative attitudes toward agricultural chemicals are spreading among consumers, and consumers are increasingly interested in finding out information about production, that is, how agricultural products are grown. Finding new methods of approaching consumers is becoming an essential factor for the current-day agricultural sector.

Large-scale PC communication services like PC-VAN and NIFTY-SERVE offer a "Corner for direct shipment from producing districts". Agricultural products are already being actively sold by correspondence (mail-order) by the use of such services. When a farmer receives an order by this method, he can send the product from a nearby door-to-door trucking company agent or from the post office by next-day delivery service. Information about electronic mail-order sales of agricultural products is being transmitted from farmers and agricultural cooperative associations in mountain areas in Hokkaido, from all of Kyushu, from Ehime, and from suburban areas like Ibaraki and Chiba.

Some areas have an electronic direct shipment service with a membership system. When a member of a large PC communication service makes an order, he or she is asked to join the PC network of the local area. Thus, rural areas are beginning to form new PC communities in

which urban consumers can participate electronically.

The advantage of direct electronic shipment from producing districts using PCs is that producers and consumers can exchange messages directly. Consumers can transmit their reactions directly to the producers and the producers can reply directly. For example, a consumer can say, "The cucumbers were good because they had no bitter taste," or "The tomatoes were not sweet enough", and the producers can frankly reply, "We did not have enough sunshine because it rained too often, so this is extremely fresh even if it is not that sweet", or "We are sorry but we have had to raise the price slightly because heating costs soared; if this price is OK, please send us an order."

In many cases, a sense of trust between the two gradually builds through such communications. One young farmer who operates a PC network in Hokkaido invites urban consumers to farms to give them a "one-day farming experience". The farmers can candidly show the consumers how severe farm work is, communicate their insecurities about their dependence on their weather, and demonstrate their trial and error efforts to decrease the use of agricultural chemicals. This gives farmers

and consumers an opportunity to frankly discuss the use of agricultural chemicals.

Of course, they can continue to exchange opinions and demands by PC communications after the one-day farming experience. In this way, a new form of agriculture is being created based on "heart-to-heart communications" using PCs. PC communications were used initially for the exchange of information between local agricultural cooperative associations and farmers or between farmers. Then PCs began to be used for the exchange of information between farmers in different areas, and they are now being used for direct exchanges between farmers and consumers. It can be said that a new community, in which rural and urban areas are unified, is beginning to be formed by PC communications.

A new system has been started in Nagano that connects the PC communication networks of local governments and agricultural cooperative associations, and through which even residents in adjacent cities and towns can obtain information about agricultural products from their PCs. The utilization of PCs in agriculture is gradually being linked to networks in urban areas, and the role of PCs in agriculture is extending from regional informatization to the formation of new communities.

## Chapter 6

# Informatization for Individuals and Their Lives

### 6.1 Changes in Personal Life Brought about by Information Infrastructure

The final objective of regional informatization is to support informatization for the individual. Many of the various informatization projects led by administrative organizations such as central and local governments aim not only to improve the information environment for pioneering individuals who are already involved in the advanced utilization of computers and telecommunications, but also aim to offer the advantages of advanced information and telecommunication systems to ordinary people who have been left behind by the progress of informatization.

Enterprises like convenience stores, supermarkets and gasoline stations have constructed advanced telecommunication networks for the purpose of raising business efficiency. These networks now offer each local resident the opportunity to utilize the accomplishments of information infrastructures implemented by the use of the frontier technologies of today's society. Conveniences in personal life attained through informatization are bringing about dramatic changes in people's thinking and views with regard to the natural environment and society.

Most particularly, individuals who are keen about information technology are rapidly

changing their forms of work and life styles. A new concept of "Collaboration" is forming as a result of the informatization of individuals, in which a number of people who are physically far away from each other pursue the same work jointly and simultaneously by electronic means. This can be regarded as a symptom of the emergence of a new work style in the industrial world.

Also, a new sense of value that could be called "symbiosis" is spreading, by which people strive to enrich their lives by cooperating with each other directly and indirectly, even though this cooperation may not necessarily be regarded as joint work. Computer systems and electronic networks are a new form of social infrastructure to support new forms of work and living for the individual. The construction of a new electronic community is beginning.

### 6.2 Expanding Network Utilization and Improving the Environment

Growth in shipments of personal computers and word processors is slowing down slightly in terms of monetary value. However, the trend towards smaller physical size and higher function models continues. Total shipments have far exceeded 10 million units in Japan, so it is supposed that there are about 10 million users. Unlike the European and American markets, the Japanese market is characterized

by the remarkable dissemination of single-purpose word processors. Single-purpose word processors are personal computers on which word processing software is already mounted at the time of shipment. They have extremely advanced word processing functions, and printers are included in the standard specifications in most cases. They have simple database and spread sheet type computing functions, but in this respect they are far inferior to the corresponding software for personal computers. However, the prices of word processors are less than half the price of a personal computer. It should be noted that word processors are accepted more readily than personal computers at offices and in the home and are thus a major factor promoting informatization.

Informatization has progressed mainly for a rather limited objective in Japan. In other words, the kind of machines that have gained high popularity are word processors, which are used for creating documents and have a somewhat low functional level. Personal computers, too, have been used mostly for creating documents to be submitted to superiors. As a result, not many personal computer or word processor models have network functions. Japanese enterprises are far behind European and American counterparts in the utilization of LANs. It is suspected that less than 5% of personal computers are connected to advanced networks like LANs. Compared with Europe and America, in Japan personal computers (word processors) are used as stand-alone machines in more cases. However, the range of people who subscribe to PC communication network services using public communication lines is expanding gradually from PC hobbyists to ordinary users. All computers will most likely be connected to

networks in the near future, as network services extend their capacity and as the information infrastructure within companies improves.

### **6.3 PC Communication are Steadily Expanding**

#### **(1) PC communication users exceed 1 million.**

According to the first nationwide fact-finding survey on PC communication networks conducted by the New Media Development Association, the total number of members registered on networks has reached 1.1 million, indicating steady growth in the PC communication population. PC communications are used for a multiplying variety of purposes, including communications between specialists, business activities by companies, and local promotions in addition to personal pleasure and living. The members of these services include word processor users as well, because some word processors have communication functions.

PC-VAN, the largest network service operated by NEC, has 320 thousand members, while NIFTY-Serve has 290 thousand members. The number of members in both has nearly doubled since the same term of last year. Therefore, there are more than 13 networks with more than 10 thousand members, figures which show that the number of members of large networks is increasing rapidly. The survey confirmed the existence of more than 1400 small networks operated by individuals or groups. Most of these networks are operated by individuals. A network service can be started easily if personal computers, modems and telephone lines are available.

Therefore, it is suspected that there are several thousand networks in operation in the country. Some of the networks are actually operated by public offices or local governments for the exchange of information between organizations.

SIGs (Special Interest Groups) and forums, which are electronic conferences for communication between users, form the nucleus of many PC communication networks. Initially, most of the topics discussed were related to personal computers themselves, such as the performance and comparison of personal computers and game software. This was partly because most members at that time were personal computer hobbyists. However, as more and more ordinary users join networks, the range of topics is expanding to general social problems, such as political issues, environmental problems, education problems and agricultural problems.

#### **(2) ISDN support started.**

One of the most important factors contributing to the progress of PC communication services is the advances in digital communication technology that are being applied to communication lines and the expansion of the services that are available. INS-P (packet) is one of the digital communication services available from NTT (Nippon Telegraph and Telephone Corp.) This service was adopted by some networks, including commercial networks, as soon as it was made available, so ISDN is already being used for PC communications. At present, there are slightly more than 100 thousand ISDN subscribers, who use ISDN mostly as back-up lines for business operations. ISDN can eliminate the need to install new lines for telephones, facsimile machines

and PC communications. This is a large advantage for apartment houses where the installation of new lines involves difficulties. Since ISDN can thus absorb new users who were not initially anticipated to use networks, it will make a large contribution to informatization for individuals.

#### **(3) Extension of electronic mail services desired.**

Electronic mail services have been enhanced in various ways and can be linked with other media using computer data functions. For example, electronic mail services can be interlocked with pocket beeper (paging) systems and the contents of electronic mail can be heard in voice form by means of interlocking with a voice mail system or can be outputted to a facsimile machine. The current problem is that electronic mail cannot be exchanged between different networks. The "Internet" e-mail network used at universities and research institutions already covers nearly the entire world, and is being connected with commercial electronic mail services in the U.S.A. Some attempts to exchange information over the boundaries of network are being initiated.

#### **(4) Machine translation service begins.**

One large commercial network has begun to offer a machine translation service through electronic mail. The current service is limited to translation service between Japanese and English. When a user sends the service a Japanese document by electronic mail, the center immediately returns an English document that has been translated by an automatic translation system. Thus, it has become possible to utilize a machine translation service easily from a PC or a work processor at home.

Since a high-speed workstation is used for this machine translation system, its cost is low in comparison to previous machine translation systems, which use general-purpose computers. However, the system is still not inexpensive enough to be purchased easily, so this service enables users to utilize such machine translation system from home by PC communications. At the present time, the service simply translates documents sent by users and returns the translated documents. It will become a more complete translation support tool if advanced functions are added, such as functions for selecting technical term dictionaries, functions for registering user dictionaries and functions for outline translation.

#### **6.4 Pending Problems Relating to Informatization for Individuals and Their Lives**

##### **(1) Problem of exchange between PC communication networks**

It is said that the number of PC communication users has exceeded 1 million, but there is an obstacle to the further expansion of PC communications in that electronic mail cannot be exchanged between different networks. The lack of means for sharing electronic conference messages between different networks is another problem hindering the future progress of informatization.

The Electronic Network Forum, a group which promotes electronic media such as PC communications, has proposed a simple message exchange system called the Electronic Network Forum (ENF) procedure (ENF/MES) and a transfer protocol (ENF/MEP) in order to solve this problem. Their aim is to establish simple and immediately adoptable procedures in

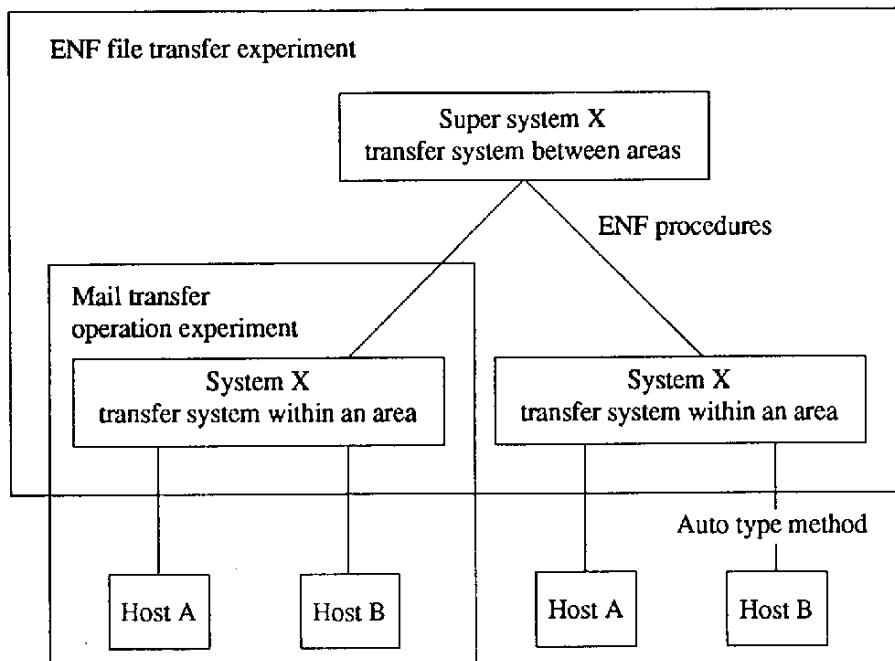
technical terms that enable the free transfer of mail between the 2,000 or more PC communication stations currently available in Japan. They differ from the international standards, such as MHS, proposed by CCITT in that they are simple and easy to use.

Figure 1 shows the configuration of a transfer experiment system used in 1991. Hosts A, B and so on are existing PC network stations. Eighteen network stations and about 500 users participated in the experiment. The basic idea of the experiment was as follows. Each of the host stations has a tree structure with two hierarchical levels, and is connected with a system X and a super system X. The system X connects all the host stations within an area or prefecture, while the super system X connects the various systems X. Any user can send mail anywhere, regardless of which host station he or she belongs to. This program will be released as freeware.

##### **(2) Advances towards multi-media**

Multi-media type PCs are expected to promote informatization for individuals. Previously, PCs were developed to handle character and numeric data. Multi-media type PCs will have voice and music functions (like telephones and stereos) and video functions (like TV sets). Prototypes of such PCs are already being marketed by Apple in the U.S.A. and Fujitsu in Japan. However, their popularity has not been as high as expected.

This low popularity can be accounted for by the following factors: (1) The man-machine interface functions that are needed in order to give instructions to the PC and to output results are not sufficiently advanced. (2) One cannot fully use such computers on one's own



Source : The Electronic Network Forum

**Figure 1 The configuration of a mail transfer experiment system**

in the current environment. (3) Prices are too high. Since people need a sense of interaction, systems which ignore the creation of a sense of unity with the PC are not being accepted by many users.

The important factors connected with the spread of multi-media are probably applications and cost. For example, according to a survey on household economy, an adult spends about 16,000 yen monthly for existing media such as newspapers, magazines, and books, while a student or a young worker spends 10,000 yen monthly for video rental, CD, movies, dramas and concerts. For new media, one must pay 1,000 yen as an additional levy for satellite broadcasting in addition to the ordinary color broadcasting, 2,000 yen for JSB, which is commercial satellite broadcasting, 6,000 yen for CATV and a certain amount

for PCM music broadcasting. This amounts to about 10,000 yen in total. In addition, there are expenses for networks and package type media which do not required fixed monthly expenses such as a game cartridges or CD-ROM. The success of new media will depend on how consumers are able to obtain the funds for these expenditures which are so expensive for the user. Some may purchase new equipment by decreasing their expenditures for existing media. Some may cut down on expenses for pleasure and leisure. Expensive new media will inevitably encounter market competition with other media, as users decide how to utilize their limited funds.

### (3) Computers as group media

As networking of computers is implemented more and more, networks are enabling users to

handle information jointly. A network also enables users to handle an information space, sharing even an atmosphere of "place", because they all access the information in the same environment. Coordination of the human-made organization or system with the information environment supported by computers is important. In this sense, networking may be able to accomplish what previous media have been unable to do. This is the objective of what is called groupware.

Collaboration, not opposition or competition, is what is most important for the joint work that is pursued by utilizing computers. Computer hardware or software is expected to play an important role in accomplishing this. Concepts such as groupware and CSCW (Computer Supported Collaborative Work) have been formulated during the past several years, and it should be noted that these concepts were born from a reconsideration of the individualistic idea that people are destined to be in opposition to each other. In the past, the QC (Quality Control) concept was formulated in the U.S.A. as a form of production technology, but was improved and transformed into TQC (Total Quality Control) in Japan, due to cultural differences, and was then reexported. Just as with QC, groupware and CSCW, which originated in the U.S.A., may be improved in Japan and developed into software and hardware for achieving better collaboration.

The term "virtual reality" has become widely known. Virtual reality is a technology for creating a world similar to the real world by adding sensory factors like weight to the com-

puter world. Some anticipate that virtual reality will offer the possibility of creating experiences that are more vivid than the real world. However, in search for information space, "hyper" reality is actually more in demand than "virtual" reality. This is related to the view that the role of the computer should not be limited to reproduction of the real world with complete fidelity. Computers may not only be able to create a world which follows the narrow physical laws of nature, but also may be able to create worlds which are governed by entirely different laws of the universe. They may create other "real worlds" in which a person can pass through substances or easily lift heavy objects. There are a number of new attempts to electronically implement all laws as probabilities. Therefore, this kind of "reality" created by computers is of a higher order than the reality we know. This is why the term "hyper" is used.

Even if it is divided up, information does not necessarily decrease; it increases in some cases. One of the characteristics of information is that more information can sometimes be obtained through mutual exchange. In this sense, information space may be regarded as an infinite resource. We can enhance and expand the information space instead of struggling for the limited resources of the earth. Seen from this standpoint, there is no need for useless struggles to arise. We need only learn from each others' strengths, absorb them, and use them to devise new methods. It is expected that new values may be born as the result of utilization of information, from attempts to create symbiosis between groups.



## Current News

### **\* NEC to Tie Up with AT&T in Portable Personal Computer Development**

Nippon Electric Co. will join hands with AT&T in the development of a next-generation portable personal computer. They will develop a palm-size personal computer that employs a pen input method in which characters and numerals can be entered by hand using an electronic pen. Provided with a radio communication function, the computer will enable exchange of data with remote locations. It will be equipped with a high performance central processing unit (CPU) developed independently by AT&T. Compared to conventional CPUs, this new CPU is small in size and features high processing performance and low power consumption. Thus it will be suitable for use in portable personal computers designed to be carried around for long periods. The two companies plan to develop their new portable personal computer for commercial use by building in specialized application software for sales and the financial, insurance, and securities businesses, and so on. NEC is expected to be the manufacturer of the computer. The two companies hope to commercialize the machine before the end of the year. They are considering marketing the machine in the U.S. through AT&T in the future.

NEC and AT&T have been cooperating extensively in the semiconductor and telecommunication fields, in joint work in 1990

on the development of ICs for specific uses, for example. Their cooperation this time is expected to lead to deeper relations in the computer field as well.

### **\* Toshiba, IBM and Apple Negotiating for Tie Up in Multimedia Business**

Toshiba, IBM and Apple Computer are holding talks on an extensive tie-up in the multimedia business. The three companies will cooperate in activities ranging from the development of basic software to the development, manufacture and marketing of machines for individual users. As a first step, they will work jointly on the development of personal information devices using CD-ROM. The devices will be applied to travel guides for general consumers that explain tourist destinations by using animation, voice and characters, portable commercial terminals that explain how to fix automobiles or service aircraft, training and education equipment, and so on.

In the field of basic technology, Toshiba will join the development of basic software for multimedia that is currently being tackled by Kaleida, a company owned jointly by IBM and Apple. The three companies will develop a variety of multimedia devices based on the basic software.

Since October 1991, IBM and Apple have been working together in a wide range of fields extending from software to personal computers and workstations. As for multimedia, they have already established close cooperative relations by setting up Kaleida as a joint venture company. This time, they have decided to join hands with Toshiba because AV-related technologies and home appliance miniaturization technologies are indispensable in the multimedia field.

Meanwhile, Toshiba, together with C. Itoh & Co., is cooperating with Time-Warner in building up its video and music business. By tying up with IBM and Apple in the development of devices, Toshiba intends to consolidate its multimedia business base from both the software and hardware sides.

#### **\* JISA Releases Forecast of Information Service Industry**

The Japan Information Service Industry Association (JISA) has worked out a forecast of the information service industry. According to their projections, the information service industry will see a strong average annual growth rate of 12.1% from 1990 to 1996, supported by growth in the systems integration business and the systems operation business. In the ensuing period from 1996 to 2001, growth is projected to slow down a bit, as the market matures, to 9.7%.

In 2001, the software development sector is expected to account for 55.8% of the market (¥10,319.9 billion), the package and other software product sector 9.7% (¥1,802.8 billion), and the information processing service sector 8.1% (¥1,491.6 billion).

The slump in business corporation information investments caused by the current recession has become a frequent topic of discussion. From a longer perspective, however, the expansionary trend is projected to continue, with the market size reaching ¥11,660.0 billion in 1996, a 1.99-fold increase over 1990, and ¥18,504.8 billion in 2001, a 3.15-fold increase over 1990.

#### **\* Toshiba, GI, MIT Agree to Tie Up for Development of American Type HDTV**

Toshiba has agreed with General Instrument (GI) and the Massachusetts Institute of Technology (MIT) to cooperate in the development of high definition TV based on a U.S. system. Under the agreement, Toshiba and GI will jointly develop a TV set that conforms to the standard developed by GI and MIT and proposed to the Federal Communications Commission (FCC). As for the decoder, the key component, GI will develop a prototype on its own while Toshiba will work on the development of mass-production technology. Under a license to be granted by GI, Toshiba will develop a TV set that incorporates the decoder and manufacture it in the U.S. With respect to VTRs, the Japanese company will be completely entrusted with their production based on GI's basic technology because GI has no VTR manufacturing technology.

The FCC is scheduled to decide on the U.S. HDTV system by mid-1993. Although five standards have been proposed to FCC already, the GI-MIT standard is considered to be most likely to be adopted. Toshiba's tie-up marks the first case of U.S. - Japanese cooperation in the development of HDTV based on a U.S. standard. U.S. manufacturers have so far tried to develop HDTV largely by themselves. But the GI group

has judged it necessary to seek a Japanese company's cooperation in high technology, manufacturing technology and financial capability.

U.S. - Japanese business partnerships have already been formed for the development of HDTV based on the Japanese standard, "High Vision." The Fujitsu, Sony, Hitachi and Texas Instruments group and the Sanyo and LSI Logic group are keenly competing in the development of HDTV.

#### **\* Computer Makers Stepping Up Joint Development Efforts with Foreign Partners**

In the computer industry, there have been some major moves in which Japanese manufacturers will develop products jointly with overseas partners. For example, Mitsubishi Electric will join hands with Apricot of the U.K. in developing a new computer that can serve as a network core. Fujitsu will increase its equity interest in Pocket Computer of the U.S. to 100% to promote the development of portable machines. Fujitsu will also embark on the joint development of a new personal computer with ICL of the U.K.

Mitsubishi Electric acquired Apricot in May 1990 and has started selling Apricot products in Japan. In 1991 Mitsubishi put its personal computers on sale in Europe through Apricot's sales network and also transferred its substrate

manufacturing technology to the U.K. company. They are now jointly working on the development of a server computer with an automatic operation function that can perform data interchange with multiple personal computers on a network. Based on Apricot's FT series servers, it will feature enhanced functions, including remote control and remote monitoring. A project team consisting of engineers from the two companies will strive for early commercialization of the computer.

In the meantime, Fujitsu will raise its equity interest in Pocket Computer from 85% to 100% in an effort to strengthen its development capability in the field of portable personal computers. In addition, by sending personal computer engineers to ICL and Nokia Data, an ICL subsidiary, Fujitsu has started to pursue technological exchanges for personal computer development in such growing fields as multimedia and pen input.

Cooperation by Japanese manufacturers with their overseas partners has so far centered around production and marketing. There have been few cases of joint development that have led to disclosure of unique technologies. But now that sales competition has become even more fierce in the global high-tech recession, there is an increasing tendency in the computer industry toward stepping up product development through technological cooperation with overseas partners in an effort to capture users.

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