The Policy Recommendations
on

"Japan and International Society in the Age of Information Revolution"

Drafted by

Shumpei Kumon, Tadao Saito, Tsuruhiko Nambu, Norimasa Shimada,
Jiro Kokuryo, Yasuhide Yamanouchi

and

Signed by

Hisao Kanamori, Kenichi Ito and 80 Other Members of the Policy Council

Promoted by

NEC Corp., Nippon Telegraph and Telephone Corp., and CSK Corp.

and

Supported by

Information Technology and Communications Policy Forum of Japan

Tokyo, August 1998

The Japan Forum on International Relations, Inc.

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Deliberations in the Policy Council on May 9, 199

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The Purport

It has been just over two years since the US moved to a fully liberalized system for telecommunications and broadcasting via the 1996 Telecommunications Act and several months since the countries of Europe adopted a similar system, and the information revolution continues to accelerate at a lively pace in both the US and Europe. Demand for data transmission in the US has begun to expand at a surprisingly high rate, growing by an estimated multiple of 10 each year, i.e., by 1000 times over a three year period. With the emergence in the market of "new generation information and communications enterprises", supply is now swelling at a rate surpassing even that of demand.

In the area of data transmission use, expectations are highest for the development of electronic commerce, and even Europe within the next three years is forecast to see annual sales of US$64.4 billion, 50 times the current level. The US Department of Commerce, in a report entitled "The Emerging Digital Economy" released in April 1998, essentially declared victory on behalf of the US, which has played a leading role in the information revolution of recent years.

By contrast, Japan, which is said to have systematically pushed liberalization and openness even further than the US, seems clearly to have hit a ceiling in its use of information technology. The brakes have been slammed down hard on growth in the use of personal computers and the Internet. If the US can be said to be in an "upward spiral" in terms of progress in this area, then Japan can certainly be said to be in a "downward spiral". Taking, for example, investments in information technology, the serious economic recession has forced Japan to suspend new investment in information technology. Even if policies were adopted that would spur domestic demand and lead Japan out of this recession, the delay in the introduction of information technology means that the existing commercial environment and facilities lack international competitiveness and these moves would still fail to

produce a steady recovery and an expansion of production. Laying a wider network of communications trunk lines would not likely improve demand locally, discouraging companies from boldly setting out on this course. Even the introduction of a high-speed Internet access network to spur local demand, given the inadequate area presently covered by trunk lines, would not allow full advantage to be taken of such a network.

There are a number of reasons why Japan lags behind the US and Europe, and the present situation in Japan can simply no longer be neglected. Failure to act now will not only cause immeasurable harm to Japan itself, but would drag down the development of the entire global economy and prove especially detrimental to the recovery of the slipping Asian economies.

As the use of information technology accelerates, the information and communications infrastructure for a new age, heretofore referred to by the abstract terminology National Information Infrastructure (NII) and Global Information Infrastructure (GII) is gradually taking form. A wide-ranging consensus has also been reached in favor of networks utilizing the Internet Protocol (IP), i.e., IP networks.

Opinions and policies are divided, however, on issues such as, say, whether networks should be designed in a decentralized fashion to facilitate user control or concentrated for more effective management by network administrators. Another current issue regarding communications trunk lines is whether a formula should be adopted, taking into account the existing telephone network, that aims for various levels of Quality of Service (QoS) or whether a new optical fiber network should be constructed from the outset. Yet another topic of debate is the choice in establishing access networks to trunk lines between pursuing a "Fiber to the Home" (FTTH) policy whereby optical fiber lines are immediately run to homes and offices and developing commercial use of high-speed access technology that makes active use of existing telephone lines.

In terms of actual use, forecasts differ on whether these IP networks should for the time being be principally oriented towards use by businesses (communications and transactions within and between companies, use by government organizations, schools, hospitals, etc.) and communities (volunteer activities, hobbies, business and

political activities, etc.) or emphasize instead "information appliances" and a diversity of "digital contents" for the general consumer market. These are not, of course, necessarily mutually exclusive alternatives even now, and the future will likely see both established in a naturally complementary fashion. The choice of to which of these to give prominence will determine whether networks should be constructed to make possible high-speed dual-direction transmissions with information providers and consumers on an equal footing or be designed in favor of downstream flow (from providers to consumers) rather than upstream (from consumers to providers). A question of direction also arises in regard to local LANs: should priority be given to LAN development stressing high speed or should "home LAN" networks be promoted that allow a variety of information equipment in the home to be controlled from a single point?

Given the many "crossroads" foreseen for the future and the rapid progress of technological innovation that makes accurate forecasting virtually impossible, the future of the information and communications field appears at first glance to be one of chaos. Some observers have even likened the present situation to the arrival of a tidal wave. There is no doubt that the information and communication industry will have undergone a drastic change when this tidal wave recedes, but in what ways it will have changed are beyond forecasting.

Lamenting this opacity, however, is useless. The information revolution in both industry and society has only just begun, and what must be done now is to make the maximum use of the technology and resources at hand. With this in mind, we would like to propose the following approaches be adopted.

(1) The social infrastructure required by the information revolution should be constructed. More specifically, this means concerted voluntary and cooperative efforts throughout Japan to establish "Community Area Networks" (CANs) as discussed in Recommendation 2.

(2) The various branches of the private sector should undertake the reform of business processes, a precondition for the greater use of information technology, and endeavor to train information system specialists as well as promote the construction of open yet highly secure networks.

(3) General understanding of the elements key to more widespread use of information technology and of the fruits of the information revolution - the technology, products, services, information, and knowledge - should be expanded through schools and adult education programs; the technical skills of each and every citizen in using computer networks should also be improved. Such an approach will help create a positive "social cycle" between the construction of information infrastructure and public understanding of the use of information technology.

(4) In furthering the information revolution, the gaps between societies and nations as well as those within societies and nations should not be allowed to widen excessively, and to this end education and the wider use of information within communities should be promoted. At the community level, in addition to promoting NGO-NPO activities for the social good, rules of behavior and ties between duties and obligations should be clearly set out so that global online commercial activities do not conflict with or contradict national security concerns and social customs and practices.

From the standpoint of promoting global cooperation as well as competition among countries, regions, and organizations worldwide, we would like to offer the following 16 policy recommendations.

Different issues confront individual sectors of society in connection with the introduction of information technology, and accordingly we have roughly categorized our policy recommendations as follows:

(1) Policies for integrating information technology throughout society: 1, 2

(2) Private-sector and information technology user issues: 3, 4, 5, 6, 7

(3) Educational issues: 8,9

(4) Legal systems and overall government involvement: 10, 11, 12

(5) The information and communications industry and telecommunications and administration:13,14,15,16

August 24, 1998

Signed by:

[Head of the Task Force]

Shumpei Kumon

[Members of the Task Force]

Jiro Kokuryo	Norimasa Shimada
Tsuruhiko Nambu	Yasuhide Yamanouchi
Tadao Saito	

[Chairman of the Policy Council]

Hisao Kanamori

[Vice Chairman of the Policy Council]

Kenichi Ito

[Members of the Policy Council]

Kazuo Aichi	Takashi Inoguchi
Masaya Fujimura	Hidekazu Inoue
Hajime Funada	Koichiro Ishii
Masahiko Furukawa	Eisei Ito
Shigeki Hakamada	Kazumasa Iwata
Hitoshi Hanai	Ikuo Kabashima
Kei Hata	Toshikazu Kadota
Yasuo Hattori	Yasunori Kakinuma
Wataru Hiraizumi	Koji Kakizawa
Yoshikatsu Hironaka	Fuyuko Kamisaka
Toyoaki Ikuta	Fuji Kamiya
Eiichi Imagawa	Kumao Kaneko
Takashi Imai	Hirohisa Kato
Kuniko Inoguchi	Akio Kimura

Tomoyuki Kojima

Takeshi Kondo

Tadateru Konoe

Makoto Kuroda

Daizo Kusayanagi

Koichi Maeda

Tadao Maeda

Teruhiko Mano

Masaya Miyoshi

Toshiharu Morii

Isao Nakauchi

Shoh Nasu

Satoshi Niibori

Akira Nishio

Kanji Nishio

Nobuo Noda

Toshiaki Ogasawara

Yunosuke Ohkura

Eiko Ohya

Hikaru Oka

Masao Okonogi

Takayuki Osanai

Hiroji Ota

Masahiro Sakamoto

Tomohisa Sakanaka

Seizaburo Sato

Hidetake Sawa

Tadahiro Sekimoto

Katsumi Sezaki

Toshiyuki Shikata

Haruo Shimada

Ichiro Suetsugu

Toichi Suzuki

Yoshio Suzuki

Soichiro Tahara

Sumiko Takahara

Kazuo Takahashi

Tadae Takubo

Yasumasa Tanaka

Tadao Uchida

Kimio Uno

Akio Watanabe

Toshio Watanabe

Susumu Yabuki

Tatsuo Yamaguchi

Akiko Yamanaka

Masayuki Yamauchi

Ippei Yamazawa

Takeshi Yano

Taro Yayama

Haruki Yoshida

Yasuhiko Yoshida

(In alphabetical order)

The Policy Recommendations

1. [Constructing IP Networks as Part of a Global Information Infrastructure for a New Age]   *A variety of visions of a future information society have been presented since the 1980s. Spurred on by commercialization, the Internet, originally a computer network used principally for academic purposes, has expanded rapidly and assumed the mantle of a global information infrastructure. Japan lags far behind the US and Europe in the construction and use of IP networks built upon the Internet communications protocol, and expansion of this gap must be halted immediately. It is also urgent, too, that Japan earnestly encourage the construction of IP networks.*

A variety of visions of a future information society have been presented since the 1980s, among them the concepts of "softnomics" and the "multimedia society". There have also been many attempts at commercializing multimedia service utilizing cable television and telephone lines to establish an infrastructural base for this information society.

Meanwhile the Internet, originally a computer network used principally for academic purposes, has expanded rapidly and has now assumed the mantle of a global information base. The wide area network that has been suggested as the form which the information and communications systems of a new age should take has been embodied in the Internet communications network built on the Internet Protocol (IP). IP is the overall term for the communications procedure on the Internet, and the "IP paradigm" is the concept of comprehensively linking a variety of network infrastructures via IP to create an open and wide area information base. Recently the US Federal Communications Commission (FCC) as well as the US

government essentially committed themselves to this vision. IP networks will naturally evolve even further with future technological advances, but the major direction they will take seems to have been set out already.

Japan lags far behind the US and Europe in the construction and use of IP networks, and the expansion of this gap must be halted immediately. To that end, Japan should (1) proceed further with deregulation so that new IP trunk lines can be constructed through cooperation and competition among both foreign and domestic companies, and (2) link together local access networks, essential for realizing the IP paradigm. In concrete terms, this means establishing a policy to make widely available the rights to use communications infrastructure owned by individual companies - rights of way, the rights to use conduit lines and electric poles, the rights to utilize lines owned by Type I Telecommunications Carriers or constructed and owned by other companies for sales/leasing purposes, access rights to communications services (especially local telecommunications services) provided by carriers - to other telecommunications carriers at competitive prices. At the same time, existing communications and broadcasting companies must seriously respond to this new shift, i.e., these companies themselves must undertake the construction and operation of IP networks.

2. [Constructing CANs as a Strategic Move in the Transition to an Information Society]   *Providing public funds for the information and communications sector is essential to infuse some vigor into the Japanese economy and industrial base, both of which have been hit hard in the continuing recession. However, Japan's conventional "information public works investment" policy offers no new direction for the Japanese economy and society. We would like to recommend that an infrastructure of local IP networks which all members of the local community can join be established and that it feature applications that can be easily used by all members of the local community; we also recommend that, upon this infrastructure, the nationwide construction and operation of Community Area Networks (CANs) which can be employed by all members of a community for a variety of activities - community management, promotion of local business, various NPO activities, etc. - be considered the most important*

and pressing strategic issue in Japan's transition to an information society.

Providing public funds for the information and communications sector is essential to infuse some vigor into the Japanese economy and industrial base, both of which continue to suffer from the current recession. However, Japan's conventional "information public works investment" policy that has postponed the laying down of optical fiber cables offers no new direction for the Japanese economy and society. The infrastructural improvements in the area of information and communications needed by Japan must address the following issues.

(1) To help plant the seeds for, and meet the needs of, a proliferation of new industries, the government should directly support the start-up of new industries and create high value-added employment by providing greater opportunities to utilize information technology.

(2) The government should make possible wider access to the information market, provide new means of revitalizing conventional industries and expand domestic demand while maintaining employment.

(3) The government should provide opportunities at schools, public facilities, and in the home for the Japanese public to learn to utilize information technology and to acquire a wide range of knowledge via computer networks.

In constructing and improving IP networks, local networks are of even greater strategic importance than trunk line networks. An IP network comprising mutually linked LANs is an absolutely indispensable part of the information and communications infrastructure for local communities in an information society. The extensive construction of local IP networks is an important precondition for guaranteeing demand for trunk line IP networks.

Hence, the central government as well as local governments should provide financial support for the construction and use of Community Area Networks (CAN) throughout the country. The CANs referred to here are local IP networks (LANs, inter-LAN networks, access networks to local trunk lines, local trunk lines, etc.) which all members of the local community can join that combine applications that can be easily used for a variety of objectives and opportunities for participation in

diverse activities with support and research services provided for a fee or at no cost that cover a whole range of areas from protection and management of IP networks to application use and participation in activities. It is the construction and use of such CANs nationwide that is the most important and pressing strategic issue in Japan's transition to an information society.

3. [Reforming Business Processes as a Fundamental Means of Advancing the Information Revolution] *Japan has achieved considerable success in improving factory productivity and the productivity of standardized service operations through incorporating information technology. However, the key to international competitiveness for Japanese industry now and in the future will be broadly improving the productivity of white-collar workers by integrating information technology into their non-standardized tasks. This will necessitate a review of traditional business processes and the implementation of a comprehensive analysis of company-wide tasks and highly transparent operational processes based on a substantial understanding of information technology. Only if structural reform of industry and government administration incorporates information technology will it have any meaning. Corporate restructuring, administrative structural reform, and the reorganization of ministries and agencies will not serve to improve international competitiveness unless these are simultaneously based on analyses of information flow within operational structures and on information technology.*

Japan has from early on achieved considerable success in incorporating information technology into industrial productivity improvements and into standard service operations. It has also endeavored via information technology to bring about services that would not be possible without such technology. However, much of this progress has involved a very limited exploitation of the potential of such technology, where only a restricted number of parties are directly involved in developing and using the information technology and where conventional work methods have been changed as little as possible.

Certainly a specialist would find it much easier to construct an information

system with a limited range of involvement in the project, and indeed it is possible to create an information system without understanding all of the work performed by a particular organization. Many firms in Japan do not if possible establish information specialist positions within their own company framework, preferring instead to rely on outside specialists to integrate information technology into their operations. There is a strong tendency in such cases to limit the number of parties involved, but if such a policy is pursued without regard for conformity amongst the various groups within an organization, then the overall flow of information will in fact deteriorate.

Improving the productivity and sales/planning capabilities through the incorporation of information technology into the nonstandard tasks of white collar workers has become the key to future international competitiveness. In such tasks, people who until now have had no connection with particular information will be asked to access a broad range of information from within and without the organization, analyze it, and make appropriate judgments. To make such improvements in operational productivity, changes must be made to allow internal corporate information to transcend the walls built around the organization, to circulate widely, and to be processed with a high degree of compatibility. This will require a turn away from the attitude that information processing should be left to specialists, which leads the majority of employees in a company to shy away from any involvement therein. The integration of information technology should be wholly consigned to outside specialists, and personnel at all levels in the company should view this as an issue crucial to their own work; hence, the company should do its own planning and devise its own solutions. This issue is equal in standing to many other productivity improvement issues.

At the same time, top management should recognize the need to review their traditional company structure and to make utmost use of information technology in increasing competitiveness as a central issue to enhancing the overall competitiveness of their company. Greater competitiveness through higher industrial productivity was the secret behind Japan's international competitiveness after World War II. Top managers themselves acquired an understanding of the necessary technology, made the appropriate investments, and directed increases in productivity,

leading to greater production capacity. Plant production methods, company organization, personnel composition, and the skills required in each of these areas were radically altered and improved productivity was achieved. This success was due to the comprehension and proper assessment of the importance of technology on the part of Japanese corporate leaders from the 1960s.

In the 1990s the focus of technological improvement to operations shifted from the factory to the white collar sector, and the new means became information technology. Successful corporate management requires an understanding of how to link this technology to improved competitiveness and the will to pursue this course. All levels of corporate management from the top down must carry out a wide-ranging analysis of the firm's operations, review their traditional business processes, make suitable choices of personnel to be placed in charge of integrating this technology, and conduct retraining in necessary skills. The ability to implement such a policy and make the appropriate investments is crucial to restoring Japan's international competitiveness.

A very similar approach might be recommended to improve the administrative operations of the government. Under the Total Staff Number Law, an across-the-board cut in personnel has been carried out in government ministries and agencies, and this has been almost the entirety of the government's efforts to "slim down" its administrative tasks. As this personnel reduction was uniform and did not include any provisions to take advantage of information technology to improve efficiency, much of the old work has been outsourced and a vast number of quasi-governmental organizations have sprung up, creating a chaotic situation in which it is difficult to determine the actual number of personnel engaged in these administrative tasks. If no regard is given to "conservation of effort" through operational analysis and information technology use as well as to reorganization based on a thorough assessment of information flow, the end result of any efforts to streamline will simply be greater chaos. Organizational improvement is fundamentally a top-down decision, and persons at the highest levels familiar with information technology must demonstrate leadership in coordinating such improvement with a bottom-up operational analysis.

4. [Constructing Open Systems Needed to Integrate Information Technology]
Information systems in Japan are constructed in and by individual companies and ministries/agencies, with each of these systems being separately and distinctly developed in accordance with the specific tasks required; this has created problems of compatibility in data formats used by different organizations and in network links. While it is only natural that core systems for individual organizations were constructed independently, an excessive stress on the independence of other systems has not only impeded the improvement of productivity through networking but also has served to increase data processing costs. Organizations should actively promote the use of packaged software and construct open systems suited to networking.

The incorporation of information technology in its basic form involves computerizing operations at government offices, corporations, and other organizations, forming networks and sharing information. Computerization began in the 1960s, but initially existing operations were simply computerized with as few alterations as possible. Even within individual companies computerization was carried out on a task-by-task basis with no concern for compatibility with other tasks, and tasks continued to be carried out independently by individual sections within the company even after computerization. There had been little variation earlier in the sharing of information as most information exchange was done on paper but, with computerization self-contained within individual sections, the differences grew larger.

Additionally, computerization brought with it the need to develop software, which in the absence of any models, was produced independently by each company following its own particular way of doing things. Although computerization later become more widespread and a large number of programs became available, companies did not diverge from their own independent courses, a manifestation of the dislike of companies for changes in the flow of work due to computerization and their conservativeness in opposing change. Companies argued that protecting their own business know-how was important to ensuring their competitiveness, and it was a time where independence was stressed at the expense of all else.

In many respects, custom-designed software is easier initially to use than packaged software. Improvements to this software require independent effort, however, and such improvements tend therefore to be delayed. With packaged software, the larger the number of users, the greater the assets that can be devoted to making improvements, and it does not take long for packaged software far superior to this custom software to make its appearance.

For this reason, as computerization progressed during the 1980s, Japanese systems for a time surpassed packaged US systems in terms of detailed functions, but this dominance disappeared in the 1990s.

As the focus of computerization shifted from information exchange within companies to similar exchange between companies, extensive revisions were necessary in systems in Japan, where companies stubbornly clung to "independence" and continued to implement computerization on their own. Standardization - be it through EDI (Electronic Data Interexchange), CALS, or other means - thus became extremely difficult.

For the performance of general tasks not connected with core competence, companies should actively adopt standardized packaged software and construct open platforms all the way to the application level, abandoning their stance of pointlessly stressing their independence and rejecting changes to their traditional work methods. When one realizes that this has been made difficult not by technological shortcomings but by the rejection by even the top company managers, who seek to maintain the current system, of changes to work methods, then it becomes apparent that this is not only an issue for data processing managers but for all company members.

It goes without saying that the adoption of commercially available packaged software will require from data processing managers completely new tasks and abilities regarding understanding and assessment of this software and its compatibility with existing systems. Executive leadership is essential to bring about a change in thinking in both the providers and the users of such a system.

The use of standardized packaged software for business processes by the government as well as by the private sector will help promote the networking of documentation between the private sector and the government used in various

procedures.

5. [Building Networks with Security in Mind] *As information systems have grown in importance, so too has the need to maintain high levels of system security. Expanded networking has brought with it a greater threat of security problems. Maintaining system security requires organizations to employ personnel familiar with information systems and the tasks of these organizations, and it goes without saying that organizations must first seek to raise awareness among all of their employees of the importance of system security.*

Japanese companies and government offices are far behind their US counterparts in their use of information technology. The typical Japanese company has only one-third to one-fifth the number of personnel proficient in information technology in the typical US company. This constitutes a major obstacle to the effective integration of information technology into company operations, which is being pursued by minimizing the number of support personnel and in some cases relying on outsourcing. When problems do arise, regular employees must fall back on their own resources to resolve them, and devoting time to solving such problems increasingly interferes with the employees' normal work.

There is, however, heightened interest in security issues stemming from the introduction of information technology into the workplace. Systems have expanded via networks from stand-alone systems to intra-company networks and networks linked to affiliated companies and even the general public, and as their role has grown larger, so too have security problems. Security problems can broadly be classified into four categories:

(1) Hardware/software faults
(2) System breakdowns due to external causes: fire, earthquakes, power outages, etc.
(3) Problems due to carelessness: input of incorrect data, leakage of secrets
(4) Damage and/or leak of information due to deliberate attacks

As information becomes more and more important, these problems have an increasingly serious impact. The methods for dealing with these problems depend on

the circumstances in which the problems appear. Software bugs can be found in many application packages as well as in operating systems, and it is essential to find a suitable means of resolving these. To respond to improper operation by users, a help desk is needed. A service that separates out problems occurring in centralized control systems is necessary to respond promptly to malfunctions. Such information system management entails costs whose necessity is at times difficult to see, and for that reason such management is overlooked in Japan and the requisite funds not earmarked; this in turn makes the information systems more troublesome to use and more often than not impedes the expanded use of information technology. The deliberate attacks of hackers can also be a major headache. There has been progress made in authorization and control measures as well as in fire wall technology to combat these attacks, but means of overcoming these defenses are constantly being developed. Much of the software that these hackers use can be downloaded from websites on the network, and it is now even possible to garner ideas from articles in magazines for computer buffs to do such hacking. The situation is such now that even a person not particularly knowledgeable about programming can slip past access control barriers set up by experts. In addition to infiltration through networks, security risks are also present in media such as floppy disks which are used carelessly; software packages which have been illegally copied are regarded as especially dangerous in this regard. To ward off such dangers, potential target organizations need managers with sufficient knowledge of, and authority within, these organizations. Authorization control for single files accessed by multiple users and utilized jointly is a complex matter requiring supervisory personnel. Even then, it may be difficult at times to discover when security has actually been violated. Destruction of data and other such damage by hackers is readily apparent but it is not uncommon for data theft or eavesdropping to go unnoticed for a long time. Caution by persons actually using the computer is needed to prevent such acts, but central surveillance of the software being used throughout the system at any given time can also be effective.

In this regard, too, a sufficient knowledge of the personnel and tasks required to meet an organization's needs is essential. Greater diffusion of information technology is inevitable, but it is important to recognize that introducing information

technology and systems haphazardly and parsimoniously will only increase the public's vulnerability.

6. [Resolving the Year 2000 Problem and Other Sources of Instability in Information Systems and Administering Systems in a Socially Responsible Manner]
Information systems managed by individual corporations have come to form a neural system spanning the full scope of social activity, and the stability of these systems is thus essential for social stability. At the same time, these systems face a variety of external and internal threats that will, if successful in destabilizing the systems, result in chaos over a wide range of social activity. The Year 2000 problem is perhaps the most renown of these, and instability in even a portion of these systems caused by this problem could have an enormous impact on other systems. Despite this, there seems little interest in the Year 2000 problem in Japan, especially in companies and government offices, and appropriate approaches must be developed that recognize that the adverse effects of the Year 2000 problem will not stop with individual organizations but quickly escalate into a major society-wide crisis.

Information systems run by individual companies - be they for customers, for internal company use, or for use among affiliated companies - have in recent years become indispensable to smooth company operations. Especially for real-time systems, even a very short-term problem can have a major impact on society, and prolonged difficulties on systems that are not real-time can still make themselves felt over a broad scope. The greater the social importance of a particular system, the more likely that a technical problem will become a social one. It was sufficient in the past to guard against hardware failures, software bugs, and physical disasters, but in recent years various network-based threats, especially the Year 2000 problem, have come to the forefront.

The Year 2000 problem stems from the use of the last two digits to designate years in the 1900s; this device will need to be altered from the year 2000. A wide range of application programs and databases could potentially be affected by this problem, and all of these must be examined and the necessary corrections and

alterations made.

The programs used by typical companies have been developed over several decades, and often the persons who developed them have already quit the company, there are not longer any specialists present familiar with the programming language in which the source code is written, or the source code itself may have been lost. In these cases, confirming that no problem will occur from the year 2000 will be quite an expensive matter. All companies in the US have invested large sums of capital to deal with the Year 2000 problem, and not a few of these have made publicly known their approaches to this issue. In Japan, many software houses have seen a surge in their sales due to requests for Year 2000 solutions, but it is still unclear how many individual user companies are handling this problem; indeed, the budget for software revisions to address the Year 2000 problem in government organizations have not been sufficiently revealed.

Acknowledging the existence of social responsibility in computer use, all computer users should inspect their systems for Year 2000 problems and make clear both the results and their testing methods. The Japanese government should therefore implement an inspection of all computers used by government organizations and earmark funds for making software revisions as they become necessary.

7. [Encouraging the Training of Information System Specialists] *Japanese organizations have often taken to reducing the number of support personnel and tend to cut support personnel levels without sufficiently assessing their operational value. Within organizations overall little regard has been given to information technology - hence the clearly inadequate numbers of specialists in information systems management employed by Japanese corporations, ministries/agencies, and universities - and the assignment of non-specialist managers to oversee OA systems has become another impediment to higher productivity. If Japan is to integrate information technology more effectively in future, it will need to increase the number of information system specialists in all organizations and to encourage the training of such specialists to that end.*

Corporate competitiveness will be improved by the increased use of computers and other information technology in the white collar sector and greater individual productivity, and by using these elements to improve productivity in all departments, in overall company operations, and indeed in corporate groups as a whole.

To that end, the use of information technology for standardized tasks is a matter of course, and extensive introduction of OA technology is also essential, as is having all company employees in one form or another involved in, and taking advantage of, the information systems.

In improving productivity thus, organizations need to acquire hardware based on the newest technology and software that produced the maximum productivity, to deal promptly with any problems, and to learn to handle potential security threats effectively. This information system will not boost productivity, however, if a non-specialist manager is placed in charge of its maintenance and management. Responsibility for managing the system should go to a specialist, and support personnel can deal with problems more efficiently than the typical employee.

It is the job of support personnel to play a role in improving operational efficiency in their organizations. In Japan, especially in recent years, reducing the number of support personnel has come to be seen as a prime means of cutting personnel costs, and efforts have been directed to this end. Simple tasks which have been curtailed can be outsourced, as can information systemization tasks with which the company has sufficient experience and which have become a firmly established part of company operations. However, the introduction of information systems is still an ongoing process, and tasks being consigned to outside companies must be adequately understood beforehand.

The typical US company in recent years has normally allotted about 3% to 5% of its employee positions to information technology specialists. Of these employees, about one-half are engaged in support tasks that ensure reliable operation of OA equipment throughout the company. In many cases, the remaining half are assigned as central information technology personnel to help plan the company's overall system, enhance the openness of data, and manage system operation and security. In contrast, information technology personnel account for no more than 1% of the employees in a typical Japanese company. Additionally, the majority of these are

conventional independent system development personnel, and in not a few instances no specialists at all are assigned to OA management. As a result, OA equipment is often neglected and not used, or regular employees must take time out from their own work to resolve OA problems, reducing their productivity.

Overcoming this problem would require the posting of skilled specialists, and Japanese companies at the moment would find it impossible to hire the needed number of personnel were they to establish specialist positions within their companies on par with US companies.

In the 1970s, 10% of employed persons were in some sense involved in information technology and, even with specialists making up less than 1% and system development personnel constituting less than 0.5% of employees, these levels were deemed adequate at the time. However, by the first decade of the twenty-first century, it has been suggested that the information revolution will require 70% of employed persons to be involved with information technology and about 10% to serve as support personnel.

For Japan to maintain its production capability in the 21st century, it must ensure that the ability to use computers becomes an integral part of the education of all children, and in fact at least 10% of the population must be trained as leaders in the Information Revolution.

8. [Paving the Way for Optical Fiber Links to All Schools and Internet Connections in All Classrooms] *Despite the wide public attention garnered by the noteworthy "Nationwide School Optical Fiber Connection Program" proposed by the Ministry of Posts and Telecommunications as an integral part of the government's overall economic policy, understanding of the Internet is still low among Japanese government officials and bureaucrats and this program has been shelved, perhaps attributable to political indecision as the Upper House elections approach. This is indeed regrettable because, under the direction of the Clinton-Gore administration, various parties in the US have joined together to link up all schools to the Internet by the year 2000, and Japan is thus throwing away a golden opportunity to close in a single stroke the enormous disparity between the US and Japan that this project has produced. As with the*

economy, the US-Japan disparity in new educational infrastructure is only growing wider. The Japanese government should once again acknowledge the importance of the program to link all schools by optical fiber cables and to pave the way for Internet connections in all classrooms.

The 840 billion yen "Nationwide 40,000 School Optical Fiber Connection Program" proposed by the Ministry of Posts and Telecommunications as an integral part of the government's overall economic policy attracted much attention as a new form of public investment designed to break free of the framework of traditional public works and come to grips with the Information Age.

In this program high-speed T1 lines, as they are known in the US, with a capacity of 1.5 megabits/second (about 25 times that of normal ISDN lines) would be constructed so that individual schools could be linked by these lines to the Internet, with the first five years' connection costs to be paid by the central government. This was a revolutionary idea, as it would allow students, teachers, and young children at most schools to make full use of the Internet, something they cannot do now as the weak dial-up connection using normal telephone lines currently used requires schools to pay both connection and telephone charges.

The well-known Clinton-Gore initiative in the US is a national project to link up all US schools to the Internet by the year 2000, and a maximum of $2.2 billion in subsidies have been earmarked for this purpose for FY1998.

Already 78% of schools in the US were hooked up to the Internet as of the end of last year, while by that same time an estimated 10% of schools in Japan were connected. This disparity is large enough judging just by these broad figures, and grows to disheartening proportions when one looks not at the number of schools but at the number of classrooms with Internet access.

According to a survey by the US National Educational Statistical Center, in 1994 a mere 3% of classrooms were connected to the Internet. This grew to 8% in 1995 and to 14% in 1996, and nearly doubled again by the end of last year to 27%. If this pace is maintained, then, with the support of the government's enormous subsidy program, it seems likely that the majority of classrooms in the US will be directly connected to the Internet by the end of this year.

It must be recognized that Internet-connected US schools are not at all like those in Japan, which usually have a special PC room with a few computers connected to the Internet where students come into contact with these computers only about once a week.

It goes without saying at leading schools in the US that every classroom from kindergarten onwards will have two or three computers connected to the Internet, and in the library's "media center", there are usually 10 or more computers available to search for books or to retrieve information from the Internet. Internet computers are for teachers the equivalent of textbooks, blackboards and chalk, while for students they are encyclopedia, reference book, notebook, and pencil all in one.

Nevertheless, as the US is such a vast country and has so many small to medium-sized local telephone companies, laying optical fiber lines up to each and every school is far more difficult task than for Japan and thus connecting all US schools by optical fiber lines is not now under consideration; instead, T connections are being partially provided using conventional copper lines.

Hence, if all schools in Japan were connected to the Internet by optical fiber lines, then Japan would at a stroke surpass the US, at least in terms of communications infrastructure. However, in view of the fact that the plan to install personal computers in schools at least has proceeded smoothly, it seems that bringing the Internet connection status of schools in Japan to a level not inferior to that in the US was not simply a dream.

The rejection of this program, though, means that plans to hook up all Japanese schools to the Internet will now consist of no more than a connection subsidy of 2 billion yen this fiscal year through local subsidy tax grants based on the Ministry of Education's suggested "2 hours' daily of Internet connection time". This will without doubt widen the US-Japan gap to a despairingly large degree. The government should once again recognize the importance of plans to link all schools by optical fiber cables and pave the way to Internet connection for all classrooms.

9. [Promptly Devising a New Concept of Education that Employs the Internet and Establishing the Necessary Social Infrastructure] *"Internet education" in Japan is an extremely vague term with little impact, and the problem is likely that no*

clear means of effectively integrating the Internet as an educational tool has been set out. The value of doing so, however, can be seen in the example of the US and the major changes it has brought to educational quality there. The "implant" style of education in which information, be it understood by the teacher or not, is simply conveyed to students in accordance with a curriculum is being increasingly rejected in favor of a system by which students can learn by themselves not by being taught by teachers but by receiving help towards achieving their own learning objectives. This direction provides the foundations that children growing up during the Information Revolution should acquire. Realization of such a system will without question require both personnel and financial support; if public funding alone proves insufficient, then schools should consider approaching corporations directly for contributions.

The term "Internet education" in Japan generally brings to mind a special classroom furnished with several computers where students gather once or twice a week under the guidance of an instructor to peer at several computers linked to the Internet, which are used for such purposes as exchange with schools overseas or transmission of data worldwide by schools participating in a global acid rain project. In essence, the Internet serves simply as a "convenient means of communication" for most Japanese schools. Given the poor connection circumstances of these schools, they may have little other choice than to use the Internet in this fashion.

If optical fiber lines were run to all schools and worries about telecommunications costs alleviated, then Internet use would very likely help dramatically invigorate Japan's currently bottled-up educational system.

It has not been reported by the Japanese press at all, but on 29 April of this year the California state legislature voted by an overwhelming majority to expand the "charter school" system. A charter school is a "public" school authorized to pursue educational aims free of traditional curricular restrictions; 31 states throughout the US now have charter schools but, perhaps due to their experimental nature, the California School Code sets a ceiling of 100 schools. As parents dissatisfied with traditional education have come to place more and more hopes in charter schools, though, there has been a growing drive to expand the number of charter schools

beyond 100; the state legislature has already decided to move the upper limit to 250 schools in the next fiscal year, with 100 more schools permitted each year afterwards, and the governor has expressed his agreement with this plan.

Why do parents have such high expectations of charter schools? Classes in public schools are generally a one-sided affair, with teachers presenting the curriculum to the students; those who can keep up are regarded as excellent students while those who cannot are cast aside, very much like Japan's educational system. Charter schools, however, do not seek to "implant" the contents of courses in students but instead to offer project-oriented education making active use of personal computers and the Internet. When necessary, these schools often negotiate directly with high-tech companies for support and assistance.

Students are assigned topics by their teachers, divide up the various research requirements within groups, and then give individual presentations on their results. Here the instructor is not a person whose role is to teach, i.e., a teacher, but an educator who offers guidance and advice, while "pupils" and "students" become instead "learners" as they do much of their learning on their own. Students are not evaluated by their class attendance but rather by the way they tackle the topics assigned them using their individual abilities and preferences; the evaluation is a positive and not a negative one. This educational method is not limited to charter schools, though, and schools around the country are beginning to adopt this method. The Internet has been a major element in this educational revolution.

Using the Internet, reports that children used to put together with an encyclopedia and a few reference books can now be written by freely accessing the newest and most complete online data, and students can discover the happiness of writing and presenting a report that steps into a world beyond textbooks.

Of course, guiding young children and students this far cannot simply rely on the individual efforts of single teachers. Educators must be backed up by a structured system of information exchange regarding useful websites, technical support for the personal computers and the Internet, and assistant teachers and parent volunteers to help children lagging behind. Schools must avoid becoming closed kingdoms and should implement systems whereby third parties can properly evaluate the results of any new experiments.

The active introduction of Internet education in the US is producing a steady supply of people familiar from childhood with information processing who will be essential in the coming Information Age, and the federal government, state governments, and local communities and companies are united in this effort.

It would seem essential in Japan, too, to improve the information processing abilities of children. This will require the government to promptly devise a new concept of education to realize this, and a wide range of measures to overcome any public funding limitations should be studied.

10. [Reorganizing the Japanese Legal System to Correspond to the Information Age] *The information revolution of recent years has to it a new industrial revolution dimension and an information society revolution dimension. The appearance and activity in recent years of many NGOs and NPOs, which differ in personality from states and corporations, and the remarkable emergence of a new type of individual - a third identity axis known as the "netizen" as opposed to the conventional identities of "national" and "citizen" - are social phenomena that mark the start of an information society as a new phase of modernization. An appropriate legal system must be established if today's information revolution is to contribute to the further development of human society. As we move even deeper into the third phase of modernization, a new legal system that might be termed "joint law" (known in English as "cyber law") that governs the rights and obligations between NGOs/NPOs and netizens on the basis of the idea of "joint rights", i.e., the concept of "information rights", must be created as common law and as positive law. At the same time, it will become necessary to attempt to define the relationship between information rights and property rights and that between information rights and autonomy.*

The information revolution of recent years has a new industrial revolution dimension (an information-intensive industrial revolution to succeed earlier revolutions in light industry and the heavy/chemical industries) and an information-oriented dimension that in a sense surpasses industrialization itself (the beginning of a third phase of modernization following the second phase known for

the militarization that gave birth to the modern state and the first phase characterized by the industrialization that produced the modern corporation); in other words, it combines the aspects of an information society revolution. The appearance and activity in recent years of many NGOs and NPOs which differ so in personality from states and corporations as well as the emergence of a new type of individual - unlike the national (an individual who has the identity of a member of a modern state) and the citizen (an individual who has the identity of both a member of a modern state as well as an employee of a company), a third identity axis known as the "netizen" - are social phenomena that mark the start of an information society as a new phase in modernization.

The netizen, in contrast with the national and the citizen (especially the citizen as a member of the 20th century consumer public), is not content to exist as a passive recipient of information and actively searches out and evaluates information, at times even creating and transmitting it. In this sense, netizens as active communicators and as members of NGOs/NPOs are also active collaborators that act with the aim of realizing the common social values of both.

An appropriate legal system must be established if today's information revolution is to contribute even more to the development of human society. In the first phase of modernization, the idea of the autonomy of the state (or nation) lead to the establishment both domestically and internationally of systems of public laws governing the rights and obligations of states and their nationals, while in the second phase private statute systems were founded on the basis of private property rights to cover the rights and obligations of companies and citizens. There were also attempts made to define the relationship between public and private rights. Reflecting on this point, it will become necessary as we proceed further into the third phase of modernization to create, as common law and as positive law, a new legal system that might be termed "joint law" (known in English as "cyber law") that governs the rights and obligations between NGOs/NPOs and netizens on the basis of a third idea which might be called "joint rights", i.e., the concept of "information rights". These "information rights" refer to the collection of rights connected with the self-autonomy of information processing and security, the reversion and priority of created information, the management of information concerning a given individual

and privacy, etc. It has also become necessary to attempt to define the relationship between information rights and property rights (e.g., the freedom to reproduce information and limitations thereon) and that between information rights and autonomy (e.g., the freedom to encrypt and limitations thereon). Coordinating this new legal system with the existing legal system cannot be accomplished overnight, but the very fact that it cannot be makes it all the more important that this issue be addressed in earnest at the earliest possible moment.

11. [Promoting Electronic Commerce on the de facto GII of the Internet] *We should recognize that private-sector initiative has advanced the construction of the de facto Global Information Infrastructure (GII) in the context of the Internet, and full advantage should be taken of this trend. The debates surrounding GII at present focus on electronic commerce (EC). The international community is currently engaged in discussions on rules for the smooth conduct of electronic commerce on the GII in connection with the issues of taxation, verification and security, and the protection of personal data, but with economic activities in cyberspace just beginning to grow at present, central and local governments should refrain from imposing additional taxes on online electronic commerce. Encryption technology is essential for full-scale use of the Internet, but it must be borne in mind that dishonest use of encryption technology might hinder investigations by law enforcement agencies. Nevertheless, from the standpoint of effectiveness, it would not be advisable to make the use of a "key recovery system" obligatory throughout Japan. As the use of information networks becomes a more commonplace part of daily life, the principle of an environment allowing economic activities to be conducted as freely and fairly as possible should be maintained in addressing these issues.*

In March 1994 at the Information and Communications Development Conference (Buenos Aires Conference) of the International Telecommunications Union (ITU), Vice President Gore presented the idea of a Global Information Infrastructure (GII), a concept which then drew worldwide attention. Since then, however, it has been private-sector investment and dynamic competition that have

advanced the cause of GII construction, and the original GII conception has yet to become a major agenda item for the international community.

The central focus of the GII debate at the moment is electronic commerce (EC). In July 1997 the US announced its "Framework for Global Electronic Commerce", the essence of which was the idea of promoting worldwide electronic commerce using the Internet. The official US position in this proposal was that electronic commerce on the Internet should not be subject to new taxes and that technical standards should be determined through private-sector competition; it did, however, stress the need to regulate the use of encryption from the standpoint of individual and national security.

We recognize that de facto GII construction in the context of the Internet is proceeding at the initiative of the private sector, and we believe that full advantage should be taken of this trend. On the subject of rules for the smooth conduct of electronic commerce on the GII, the discussion in the international community at present is concentrated on taxes on electronic commerce, verification and security issues, and the protection of individual data. With the use of information networks just beginning to enter the sphere of everyday life, central and local governments should not impose additional taxes on online electronic commerce.

Encryption technology is essential for full-scale use of the Internet. The encryption of data is vital for the transmission of credit card numbers and other personal information when conducting electronic commerce online. There are concerns, however, that investigations by law enforcement agencies could be hindered should powerful encryption technology for personal computers become widely available and utilized by organized crime. In devising measures to counter the dishonest use of encryption technology, (1) regulation of encryption technology should be restricted to the elimination of the threats of terrorism and crime, (2) commercial use and technological development should as far as possible remain free of interference to ensure cost effectiveness, and (3) an international cooperation structure should be formed to ensure security and to coordinate policies among countries. In the area of encryption technology, there are those in the US who seek the introduction and widespread implementation of a "key recovery system". A key recovery system involves a third party organization that offers storage of encryption

keys and provides means of unlocking encryption in response to requests from law enforcement agencies. However, PC encryption technology that does not rely on a key recovery system is already in use in many countries, and imposing a key recovery system on all PC encryption domestically, even if it were feasible, would substantially impede social and economic activities. From the standpoint of effectiveness, then, it would not be advisable to make the use of a key recovery system obligatory throughout Japan.

With regard to the handling of personal data, standards differ by country on the resale or other use of this information by companies possessing databases, and this has become a major issue in global electronic commerce. Companies who collect data and use data should as a rule make clear the purposes for which they will use this information and they should give consumers a choice of whether or not to provide personal data.

As the use of information networks becomes a more commonplace part of daily life, the principle of an environment allowing economic activities to be conducted as freely as possible should be maintained in addressing all of these issues.

12. [Developing an Official Japanese Approach to the Internet Governance Issue] *As large-scale commercial use of the Internet grows, mechanisms for domain name assignment, trademark issues, and more reliable packet routing have all merited reconsideration. An increasing reliance on computer networks for social activities has generated concerns about security threats, such as terrorist attacks via networks on vital social infrastructure such as communications facilities, traffic systems, and financial networks. It does not seem likely that such attacks could immediately knock out the entire Internet but, given the number of people involved, the sheer scale of the problem, and conflicts of interests, it may be difficult in the short run to come up with a solution to these security issues. Viewing the Internet as a type of social system, the issue of global governance in maintaining and developing a system which has no central government has arisen. The protection of this especially important social infrastructure calls for each country to design its own approach and, sublating past circumstances and laws/regulations, the Japanese government*

should promptly begin examining this issue and lead an open debate within Japan.

One characteristic of the Internet is its vast degree of "freedom" in that it has a "council" system of management and no centralized control mechanism or organization. This form of international council system is symbolic of the "freedom" in this "network of networks". As use of the Internet has shifted away from the original community of researchers and towards large-scale commercial use and as higher quality service is being demanded, there have been second thoughts regarding this council system of Internet management as issues arise such as intellectual property rights, acquisition of access lines, large-scale relay transmission accidents, privacy, encryption, domain name decision mechanisms, global electronic commerce, and taxes. There is also growing worry over security issues such as terrorist attacks via networks on vital social infrastructure such as communications facilities, traffic systems, and financial networks. Judging from available data and surveys, it does not seem likely that such an attack could immediately knock out the entire Internet. Given the number of people involved, the sheer scale of the problem, and conflicts of interests, it may be difficult in the short run to come up with a solution to this problem. With the international community now taking up the task of creating rules for the common task of managing the GII, one might think of the Internet, like global environmental issues, as a subject for some type of global governance.

To give a recent example, a reform movement centered on the Internet Society has gained momentum with regard to the issuing of Internet domain names, and a memorandum on domain names has been drafted by the International Ad Hoc Committee (IAHC). This memorandum included a comprehensive review of the system of addresses such as ".com" and ".gov.jp" in common use now as well as of the organizations authorized to issue these addresses, and its recommendations would have a major impact on commercial use. Although the US government has proposed a domain name system differing from that suggested by the IAHC, it is ultimately seeking to have the Internet community develop its own voluntary approach. This reform will transfer Internet management to a more commercial base

and likely make it more stable.

The Internet is thus standing at the crossroads in dealing with the new issue of a "practical GII" and the questions of whether or not the global governance issue is addressed and what kind of system or framework will arise offer many important hints for predicting the future of the Internet.

Viewing the Internet as a type of social system, it is crucial that individual countries tackle the issue of maintaining and developing this system, which has no central government, especially in regards to protecting this important element of social infrastructure. We therefore propose that the Japanese government promptly begin examining this issue and lead an open debate within Japan.

13. [Eliminating Barriers to Competition and Providing Users with World-Class Service at Low Cost] *The deregulation that has been carried out in the telecommunications field from 1996 should be praised as forward-looking in that it has removed many of the barriers that existed within the telecommunications industry. This removal of barriers to competition is a significant step in making Japan a market in which communications companies from around the world compete to offer quality service and in allowing Japanese companies and consumers to take advantage of the best telecommunications services in the world at rates that are low by international standards. While the removal of barriers may prove quite troublesome for existing companies, companies tempered in a fiercely competitive Japanese market will then be very competitive worldwide. The removal of past barriers to competition should indeed be positively assessed as forward-looking, but many outstanding issues to remain, for example, the barriers to competition between broadcasting and telecommunications companies and the distinctions made between Type I and Type II carriers in the telecommunications industry. Reform will not be painless, but in light of the global competition that continues to spur on the development of today's information and communications industry, Japan cannot afford to permit the existence of barriers that hinder adaptation to new trends. Japan should move boldly ahead with reform.*

The deregulation that has been carried out in the telecommunications field from 1996 and the competition that has been sparked thereby should be praised as forward-looking. For example, in January 1996 the Ministry of Posts and Telecommunications released a policy statement entitled "On promoting deregulation towards a 'Second Information and Communications Reform'". The significance of the series of deregulatory measures that put this pronouncement into practice lies in the fact that it eliminated a variety of barriers that existed within the telecommunications industry. As a result, rapid progress has since 1997 been seen in (1) mergers and partnerships between domestic long-distance companies and international companies, (2) cooperation between local telephone companies and their participation in the long distance market, (3) aggressive domestic participation by foreign companies, and (4) accelerated overseas expansion by domestic telecommunications companies. The most welcome of these is the vigorous competition arising in local (intra-city) markets. This trend is still underway, and even foreign Type I Telecommunication Carriers are planning to participate in local markets.

This removal of barriers to competition is significant in that it will make Japan a market in which communications companies from around the world compete to offer quality service and will allow Japanese companies and consumers to take advantage of the best telecommunications service in the world at rates that are low by international standards. In other words, eliminating barriers to competition will not only spur competition between domestic companies but will also allow foreign companies freely and swiftly to participate in the Japanese market and develop services for this market. Japanese consumers and industries will be able to choose from a diverse menu of functions and rates offered by a large number of companies worldwide in selecting those services that meet their own particular needs. This will raise the level of information and communications usage in Japan and will help stimulate the Japanese economy as a whole.

This barrier-free competition may in the short run prove to be a very severe one for some companies in Japan. Nevertheless, those companies who attract sophisticated telecommunications users and who have been tempered in a fiercely competitive Japanese market will then be very competitive worldwide.

Though the removal of barriers in recent years deserves praise as forward-looking, it must be pointed out that many outstanding issues remain. One, for example, is that of the barriers to competition between broadcasting and telecommunications companies. Vast technological and infrastructural differences used to separate communications and broadcasting quite naturally. Broadcasting was more strictly regulated than communications, on the grounds of the scarcity of the wavelengths and the impact of broadcasting. Technological progress has, however, rapidly melded the two areas. The barriers that still separate broadcast and telecommunications companies and prevent them from participating in each other's business are quickly losing their meaning.

One example of this is the distinction between lines of businesses. Telecommunications companies are divided into Type I carriers, who have their facilities and equipment, and Type II carriers, and this division has become a impediment to the entry of newcomers into the market. Newcomer companies generally wish to enter markets on a low fixed cost/high variable cost low-risk low-return strategy and then switch to a high-fixed cost/low variable cost style of management and operate in the pursuit of high profits. Translating this into the telecommunications market, newcomers initially wish to enter as Type II carriers and switch over by stages to possession of their own facilities and equipment in those areas in which they have secured a stable customer base, a Type I-Type II hybrid strategy. Competition should be promoted, to include those companies that could be labeled Type 0 that simply lease out facilities/equipment and do not themselves provide service, so that ownership or non-ownership of facilities by companies is decided strategically not because of regulations but because of economic rationality.

The gains of barrier elimination are not without their pains. Newcomers who have entered the market since 1985 on the premise that these barriers would continue to stand have suffered. Cable television companies, for example, have made investments without imagining that broadcast operations might utilize Type I carriers' infrastructure. With the removal of barriers, a number of these companies might even be forced out of business. Although these companies do deserve sympathy, Japan can no longer afford to permit the continued existence of barriers

that hinder adaptation to new trends, given the worldwide expansion of competition in the information and communications industry. Even while giving due consideration to employment for those working at companies which have become unprofitable due to barrier removal, Japan should move boldly ahead with reform.

14. [Using the Principle of Competition to Secure Access to Quality Information Infrastructure for All Residents of Japan] *For Japan to continue making cultural and economic contributions to the world economy, it is necessary that all Japanese residents and companies be well-versed in the use of information technology. "Transparency" has become a keyword in the reconstruction of Japan's political, economic, and social systems, and these reforms will require information disclosure systems that fully utilize information technology. Access to information infrastructure should not be restricted to a small number of well-to-do people but rather guaranteed to all people, and it is thus imperative that all residents of Japan enjoy an environment in which they can inexpensively benefit from world-class quality information and communications services. The long-standing mechanism of providing universal service in total disregard to market principles no longer functions properly, and appeals should be made to users as well as suppliers in both promoting competition in the information and communications industry and achieving universal service.*

Japan has until now been in a leading position worldwide in production technology as well as technology designed to improve living standards, and to continue making cultural and economic contributions to the world economy, Japan must take its skills and sublimate them into forms more suited to the Information Age. To this end, all Japanese citizens and companies should be well-versed in the use of information technology. These skills can be most effectively developed from childhood, and children should be given a wealth of chances to come into contact on an everyday basis with information technology and to develop their ability to use it.

This has become an urgent issue today. "Transparency" has become a keyword in the reconstruction of Japan's political, economic, and social systems, and an information disclosure system is needed that fully utilizes information technology.

Access to disclosed information should not be restricted to a small number of well-to-do people and should be guaranteed to all people living in Japanese society. It is thus imperative that all residents of Japan enjoy an environment in which they can inexpensively benefit from world-class quality information and communications services. In frontier fields, equally important as having the most advanced technology, or perhaps even more so, is determining the standards for an information environment that would allow all people access.

From the standpoint of economic rationality, information technology, and especially networks, have limited effectiveness when only a certain segment of people can use it but demonstrates a very powerful potential once access is opened to all people. It is easy to understand this by imagining the inconvenience of a society without telephones or postal service that serve as means of communications for all people.

Stressing the importance of access to information infrastructure by all residents of Japan is simple; actually realizing this aim is more of a problem. Historically the significance of providing "universal" access to an information network has been discussed within the context of "universal service" in a systematic fashion. The difficulty here is that universal service cannot be provided by any of the mechanisms used thus far that ignore market principles.

The order of things in the telecommunications industry has heretofore been one of requiring companies to offer universal service through funding from the monopolistic profits that regulations have generated. Even after the collapse of this system due to the 1985 liberalization of the Japanese telecommunications market, universal service has in fact been established by requiring NTT, the dominant company, to provide such service. As competition spreads even to local communications markets and grows fiercer with the emergence of companies that specialize in highly profitable localities, however, this funding is drying up. With NTT unable to bear the burden, it seems a given that local differences will have to be applied to telephone charges. Efforts will also likely shift to the corporate marketplace, where profits can be more easily made.

To both promote competition in the information and communications industry and achieve universal service, appeals must be made not to suppliers but to users.

This should be done not only by granting special privileges to designated companies and then imposing burdensome obligations and regulations on them, but also by providing incentives and/or subsidies to individuals, companies, and localities on the demand side of the equation to purchase information and communications services; these customers can then choose and use, from among a large number of companies, the best service at the cheapest prices.

There are any number of concrete formats possible (although none of these can be achieved as long as NTT regional companies are obliged under company law to provide telephone service nationwide), but in regions where service will not be provided without subsidies, for example, competitive bids could be solicited from service provider companies to provide the desired services and rates. Service for that locality could then be entrusted to the company which agrees to provide service for the least subsidy. Funding for these subsidies theoretically should be taken from the government's general account, but more practically a small and broadly charged donation to a universal service fund could be added onto communications charges.

15. [Reforming Telecommunications Charges for the Construction of a Value-Creating Cyberspace] *It is important that companies with offices in Japan and people who live in Japan actively participate in the process of knowledge creation through the medium of computer networks, and a fixed rate system that promotes use should be introduced for this purpose. From the experience of the US, we have discovered the immeasurable merits of an environment in which communications can be carried out with others worldwide 24 hours a day without concern about additional costs. Japan, too, should promptly seek to expand introduction of fixed rate service systems that promote usage in line with new concepts and should endeavor to establish more economical rates.*

As the world becomes increasingly interlinked by networks, it is important that those companies with offices in Japan and those people who live in Japan actively participate in the process of knowledge creation through the medium of computer networks, and a fixed rate system that promotes use should be introduced to this end.

The Internet has developed explosively in the US, and behind the fact that the information industry as well as other industries and social activities that use in the Internet have prospered lies the fixed-rate system used for local communications rates in the US, by which users can access networks without worrying about usage time.

The charges for Internet access that users pay are the total of the amount paid to the Internet service provider and the amount paid to the local telephone company, and in both the US and Japan the provider charges are usually a relatively small fixed rate; the problem is the local communications charges. In contrast to the US where local communications service can be used at a fixed cost of a few thousand yen per month, in Japan one must pay a minimum of 38,000 yen to have access to service which can be used at a fixed cost 24 hours a day. Even as the gap between other communications charges narrows, in decisively important portions such as this there still exist considerable disparities.

For telecommunications companies the local fixed-rate system is bothersome, as necessary facilities and equipment must be expanded even as revenues remain steady, and indeed the fixed rate system in the US was not so much a strategic decision as an accidental product of history.

Even while recognizing this difficulty, we are continually discovering the immeasurable merits of an environment in which communications can be carried out worldwide 24 hours a day without concern about additional costs. Intellectual production activities are characterized by the "gradually increasing yield" phenomenon, whose mechanisms have not been sufficiently explained, but in which the value of this asset of knowledge grows more when combined with a variety of other knowledge than when isolated. A concrete manifestation of this is the Internet. The low variable cost structure of the Internet creates a space in which information can be easily combined together and where frequently the value of knowledge becomes self-multiplying. When such a cycle starts, there follows a chain reaction of explosive innovation throughout society that could not possibly be achieved within a single company. In fact, many important products of the information society - such as software boasting a high global market share and network connection hardware - arise from this method of using this space.

Unlike in the US, which has from the outset adopted a fixed rate system for local telephone service, hastily introducing a fixed 24-hours-a-day rate in Japan would likely result in extreme overload of existing local telephone exchanges and require a radical expansion of facilities and equipment.

Designing an approach that would aim to construct a network separate from the current telephone network, however, would allow a fixed rate system that promotes usage to be maintained. One example of this is the OCN service now being offered by NTT. Especially for communications using packets such as the Internet, a switch could be made from the traditional formula where communications rates increased based on distance and time to a system where a basic contract for a certain maximum speed of communications would be combined with network usage-based rates for different packet priority levels where the usage-based rate for low-priority communications would be zero. This would allow users to accept low priority in exchange for a low fixed rate and utilize the available volume in networks constructed with the revenues received from service to customers who demand a high and stable level of service (i.e., high-priority service) with little cost flexibility, and would ensure that usage could be promoted even while securing reasonable revenue.

This kind of thinking has in fact become a common vision within the communications industry, and a switch-over to this new rate system might accompany a conversion from networks based on telephone networks to ones based on computer networks.

In the US intra-city service provided through existing telephone networks is offered at a fixed rate in many locations, and this infrastructure has allowed an explosive combinational linking of knowledge. With an eye on the future, Japan should quickly reform its own telecommunications fee structure.

16. [Developing Global Standards for Interconnection Rules to Internationalize Telecommunications] *The globalization of the information and communications industry seemingly knows no bounds. On the one hand, corporate management has moved towards greater alliances and mergers/acquisitions, while on the other hand, the universalization of digital technology has let technology*

completely transcend national borders. In the midst of these changes, though, individual countries continue domestically to apply their own peculiar interconnection rules. Communications comprise one of the most important elements of infrastructure in these countries and social demands, in addition to technological and economic conditions, have helped in great part to determine the overall framework of interconnection rules in individual countries. Now that it has become clear that the welfare of consumers worldwide is enhanced through competition, rules should be drafted that facilitate market entry in all countries. Global interconnection rules must be formulated that emphasize efficiency and long-term development.

The information and communications industry is forecast and expected in future to have an increasingly competitive industrial organization due to technological innovation. On the other hand, the formulation of global rules for local telephone networks which constitute the core of this industry is an extremely pressing issue and is important in two reciprocal senses.

First, as local telephone networks are almost completely dominated by those carriers who were first to open up these markets - for the most part these companies were known as natural monopolies - these networks comprise a bottleneck for competitor carriers. Competitors are confronted with the choice of constructing their own local networks or receiving permission to use the networks of established carriers, and because the cost of constructing their own networks is so enormous, these carriers have no choice but to rely on the first-comer companies. The questions of whether or not these carriers can get their forerunners to lease use of their networks and how much they will demand in return for leasing them are ones that can make or break competition. Policy-wise, the first question has been resolved in the affirmative, but the second issue of how much leasing will cost is an interconnection rate issue shared by all countries. To resolve this issue, the technical structure of these local networks must be made clear and connection rules and rates set out that are acceptable to both lessors and lessees.

An increasingly important method of formulating interconnection rules of late is that for calculating interconnection rates employed in the UK and the US based on

the concept of incremental cost. This involves breaking down local networks technically, delineating the elements of these networks, and then developing models of the cost of each of these elements in terms of the latest technology. Adopting this scheme would make it possible for individual countries to formulate interconnection rules that at least have methodology in common. Adopting this method, on the other hand, would put companies at risk of not being able to recover the costs that would arise therefrom, and hence this method continues to be the subject of debate within many countries. The telecommunications market thus has transcended man-made national borders and entered a borderless era. A system must be set out that will function not only for domestic competition between first-comers and latecomers, but also for competition from abroad, and this will require global interconnection rules that disclose the elements of local networks.

As the present technological revolution moves ahead, it remains to be seen just how long the local networks possessed by first-comer carriers will continue to be bottlenecks. Even if a fair method of calculation is adopted, high connection rates to established local networks will deter competitor companies from using them and give them an incentive to construct their own local networks. Thus competition may actually arise in the area of infrastructure itself. Connection rules are important in sparking such competition and in clearly outlining the social opportunity cost of existing local networks.

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Appendixes

1. Policy Council Members Who Signed Recommendations

[Head of the Task Force]

Shumpei Kumon   Executive Director, Center for Global Communications, International University of Japan

[Members of the Task Force]

Jiro Kokuryo   Associate Professor, Keio University

Tsuruhiko Nambu   Professor, Gakushuin University

Tadao Saito   Professor, University of Tokyo

Norimasa Shimada   Deputy Editor, The Yomiuri Shimbun

Yasuhide Yamanouchi   Associate Professor, Center for Global Communications, International University of Japan

[Chairman of the Policy Council]

Hisao Kanamori   Adviser, Japan Center for Economic Research

[Vice Chairman of the Policy Council]

Kenichi Ito   President, The Japan Forum on International Relations, Inc.

[Members of the Policy Council]

Kazuo Aichi   Member of the House of Representatives

Masaya Fujimura   Chairman, Mitsubishi Materials Corp.

Hajime Funada   Member of the House of Representatives

Masahiko Furukawa   Chairman of the Board, Mitsubishi Chemical Corp.

Shigeki Hakamada   Professor, Aoyama Gakuin University

Hitoshi Hanai   Professor, University of Tsukuba

Kei Hata	Member of the House of Representatives
Yasuo Hattori	Vice Chairman, Seiko Epson Corp.
Wataru Hiraizumi	Chairman, Kajima Institute of International Peace
Yoshikatsu Hironaka	President, Institute of Mitsui and Co., for Trade and Economic Studies, Inc.
Toyoaki Ikuta	President, The Institute of Energy Economics Japan
Eiichi Imagawa	Professor, Soka University
Takashi Imai	Chairman of the Board of Directors, Nippon Steel Corp.
Kuniko Inoguchi	Professor, Sophia University
Takashi Inoguchi	Professor, Univeristy of Tokyo
Hidekazu Inoue	Senior Executive Vice President, Nippon Telegraph and Telephone Corporation
Koichiro Ishii	President, Ishii Enterprise
Eisei Ito	Member of the House of Representatives
Kazumasa Iwata	Professor, University of Tokyo
Ikuo Kabashima	Professor, University of Tokyo
Toshikazu Kadota	President, MIKI Corporation
Yasunori Kakinuma	Director, Policy Planning Office, CSG RENGO
Koji Kakizawa	Member of the House of Representatives
Fuyuko Kamisaka	Journalist
Fuji Kamiya	President, Japan Association for Defense and Security Studies
Kumao Kaneko	Professor, Tokai University
Hirohisa Kato	President, The Yomiuri Shimbun, Osaka
Akio Kimura	Professor, Aoyama Gakuin University
Tomoyuki Kojima	Professor, Keio University
Takeshi Kondo	Managing Director, ITOCHU Corporation
Tadateru Konoe	Vice President, Japanese Red Cross Society
Makoto Kuroda	Secretary General, Japan Association for Expo 2005

Toichi Suzuki	Political Columnist
Yoshio Suzuki	Member of the House of Representatives
Soichiro Tahara	Journalist
Sumiko Takahara	Economist
Kazuo Takahashi	Director, FASID International Development Research Institute
Tadae Takubo	Dean, Faculty of Social Sciences, Kyorin University
Yasumasa Tanaka	Professer, Gabushuin University
Tadao Uchida	News Caster
Kimio Uno	Dean, Faculty of Policy Management, Keio University
Akio Watanabe	Professor, Aoyama Gakuin University
Toshio Watanabe	Professor, Tokyo Institute of Technology
Susumu Yabuki	Professor, Yokohama City University
Tatsuo Yamaguchi	Advisor to the President, The Bank of Tokyo-Mitsubishi Ltd.
Akiko Yamanaka	Member of the House of Representatives
Masayuki Yamauchi	Professor, University of Tokyo
Ippei Yamazawa	Professor, Hitotsubashi University
Takeshi Yano	Senior Managing Director, The Bank of Tokyo-Mitsubishi, Ltd.
Taro Yayama	Political Commentator
Haruki Yoshida	Senior Advisor and Chief Economist, The Wako Research Institute of Economics, Inc.
Yasuhiko Yoshida	Professor, Saitama University

(In alphabetical order)

2. How the Recommendations Were Drafted and Adopted?

The theme of "Japan and International Society in the Age of Information Revolution" was proposed by the Steering Committee on July 25, 1996 and was adopted by the Policy Council on September 17, 1996. The Policy Council has continued to conduct the policy research since its first meeting on May 9, 1997.

This project was supported financially by NEC Corporation, Nippon Telegraph and Telephone Corporation, and CSK Corporation. In this connection, the Project Advisory Committee, composed of a representative of each of the three corporate sponsors, Chairman of the Policy Council, President of the JFIR and Head of the Task Force, was organized and met five times in the course of December 1996 to May 1998 to exchange views on the orientation of the policy research.

The Policy Council, which met five times in the course of May 1997 to May 1998, heard a basic concept of the Task Force at its first meeting from Prof. Shumpei Kumon, Head of the Task Force, an American perspective at its second meeting from Prof. David J. Farber, University of Pennsylvania, and an Asian perspective at its third meeting from Prof. John C. Ure, University of Hong Kong. Each time after hearing the presentation, the Council members had active deliberations on the theme.

The Task Force of the Policy Council was organized prior to the first meeting of the Policy Council with the aim of helping the Policy Council formulate its recommendations. It was composed of the following members;

[Head of the Task Force]

Shumpei Kumon	Executive Director, Center for Global Communications, International University of Japan

[Members of the Task Force]

Tadao Saito	Professor, University of Tokyo
Tsuruhiko Nambu	Professor, Gakushuin University
Norimasa Shimada	Deputy Editor, The Yomiuri Shimbun

| Jiro Kokuryo | Associate Professor, Keio University |
| Yasuhide Yamanouchi | Associate Professor, Center for Global Communications, International University of Japan |

The Task Force met five times between December 1996 and May 1998. On the basis of the discussions conducted in the three foregoing Policy Council meetings, the Task Force drafted an interim draft of the policy recommendations. Prof. Yamaouchi visited the United States in February 1998 and exchanged views with several experts representing various circles. At the fourth meeting of the Policy Council, Prof. Kumon presented the interim draft recommendations. With the result of the subsequent Policy Council discussions in mind, the Task Force revised the interim draft recommendations to produce a final version of the draft recommendations, which was presented to, and approved by the Policy Council at its fifth and final meeting on May 25, 1998.

The fifth meeting of the Policy Council, in approving the final version of the draft recommendations, authorized its Chairman Hisao Kanamori to make revisions within certain limits to accommodate proposals and suggestions for amendments made at the meeting before printing the recommendations. Each individual member of the Policy Council had the option of either endorsing the recommendations with his signature or not endorsing them by withholding it.

3. Chronology of Policy Council Activities on the Theme

[1996] Apr. 3   20th meeting of the Steering Committee proposed the theme of "Japan and International Society in the Age of Information Revolution" as the theme for the 1997-98 policy research program of the Policy Council and recommended Prof. Shumpei Kumon as Head of the Task Force on the theme.

Jul. 25   The Policy Council approved the proposal of the 20th Steering Committee on the theme for the 1997-98 policy research program and the appointment of Prof. Shumpei Kumon as Head of the Task Force.

Dec. 9   1st meeting of the Task Force.

Dec. 9   1st meeting of the Project Advisory Committee.

[1997] Jan. 22   2nd meeting of the Task Force.

Apr. 30   2nd meeting of the Project Advisory Committee.

May 9   1st meeting of the Policy Council held with Prof. Shumpei Kumon, Head of the Task Force, as a keynote speaker followed by discussions.

Sep. 25   3rd meeting of the Project Advisory Committee.

Sep. 26   3rd meeting of the Task Force.

Sep. 26   2nd meeting of the Policy Council held with Prof. David J. Farber, University of Pennsylvania, as a guest speaker.

Nov. 18   4th meeting of the Task Force.

	Nov. 18	3rd meeting of the Policy Council held with Prof. John C. Ure, University of Hong Kong, as a guest speaker.
	Nov. 19	4th meeting of the Project Advisory Committee.
[1998]	Feb.1− 8	Prof. Yasuhide Yamanouchi, Task Force Member, visited the United States to exchange views with a number of experts representing various circles.
	Feb. 26	4th meeting of the Policy Council held to discuss an interim draft of the policy recommendations reported by Prof. Kumon.
	May 11	5th meeting of the Task Force.
	May 25	5th meeting of the Policy Council adopted the final version of the draft recommendations reported by Prof. Kumon.
	May 29	5th meeting of the Project Advisory Committee.
	Aug. 24	The Policy Recommendations presented to Prime Minister Keizo Obuchi by Mr. Hisao Kanamori, Chairman of the Policy Council, Prof. Shumpei Kumon, Head of the Task Force, and Kenichi Ito, President of the Japan Forum on International Relations, immediately followed by a press conference to announce its publication.
[1994]	Dec. 5	6th meeting of the Steering Committee proposed the theme of "The WTO system and the Japan" as one of the two themes for the 1995-96 policy research program of the Policy Council and recommended Prof. Masahiro Sakamoto as a Head of the Task Force on the theme.
[1995]	Feb. 10	The Policy Council approved the proposal of the 6th Steering Committee on the theme for the 1995-96 policy research program and the appointment of Prof. Masahiro Sakamoto as a Head of the Task Force.

	Mar. 9	1st meeting of the Task Force.
	Apr. 13	2nd meeting of the Task Force.
	Jun. 20	1st meeting of the Policy Council held with Prof. Masahiro Sakamoto, Head of the Task Force, as keynote speakers followed by discussions.
	Jul. 26	3rd meeting pf the Task Force.
	Sep. 11	Informal discussion meeting between Mr. Hans H. J. Labohm and the Task Force members.
	Sep. 11	2nd meeting of the Policy Council held with Mr. Hans H. J. Labohm Senior visiting Research Fellow, the Netherlands Institute of International Relations "Clingendael" as a guest speaker.
	Oct. 20	4th meeting of the Task Force.
	Dec. 28	5th meeting of the Task Force.
[1996]	Jun. 10	6th meeting of the Task Force.
	Jul. 7 - 14	Prof. Masahiro Sakamoto, Head of the Task Force and Prof. Yoichi Nakamura, Task Force member, visited the United States to exchange views with 10 experts representing various circles.
	Jul. 25	3rd meeting of the Policy Council held to hear the report of Prof. Yoichi Nakamura on the results of his trip to the United States followed by the discussions on an interim draft of the policy recommendations reported by Prof. Masahiro Sakamoto.
	Sep. 17	4th meeting of the Policy Council adopted the final draft of the policy recommendations reported by Prof.

Masahiro Sakamoto.

Oct. 2   7th meeting of the Task Force

Nov. 15   The Policy Recommendations presented to Prime
              Minister by Mr. Hisao Kanamori, Chairman of the Policy
              Council, Prof. Mashiro Sakamoto and Mr. Kenichi Ito,
              President of the Japan Forum on International Relations,
              immediately followed by a press conference to announce
              its publication.

4. Acknowledgements by Policy Council Chairman

As we put the finishing touches on our 17th set of policy recommendations (JF-E-I-A-0017) on the theme of "Japan and International Society in the Age of Information Revolution" after spending almost one and a half years for deliberations an d research, we would like to mention our special indebtedness to all those who in one way or another helped us in our efforts to produce these recommendations.

First of all, let us express our special gratitude to the financial support provided by NEC Corporation, Nippon Telegraph and Telephone Corporation, and CSK Corporation, Japan's three leading companies in the area of information-related industry. Without their support, this project could not have been carried out as successfully as it has been.

Prof. David J. Farber of University of Pennsylvania and Prof. John C. Ure of University of Hong Kong were kind enough to accept our request to come to Tokyo to present their views on the theme each at the second and the third plenary meeting of the Policy Council.

Let us also express our greatest appreciation to Information Technology and Communications Policy Forum of Japan (Secretariat/Center for Global Communications [GLOCOM], International University of Japan) directed by Prof. Shumpei Kumon who kindly accepted to head the Task Force of our Policy Council on this theme.

Finally we would also like to mention the helpful insights we have received from seven senior members of four ministries and two agencies of our government, who willingly granted us their precious time to attend our meetings as individuals in their advisory capacity of Policy Council Counselors. Let us also add that the views expressed in these recommendations represent in no way those of the ministries and agencies concerned and that the responsibility for the contents of the recommendations is that of those members of the Policy Council who signed them alone.