Next Generation Office Communication
— Broadband & Mobile in a Ubiquitous Society —

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1. Bottoming Out and Gradual Recovery of Japanese Economy and Signs of IT Industry's Revival

Recently, the overall world economic situation has been improving with the United States leading the way. The Japanese economy as well has finally emerged from the harsh conditions it had experienced for some time and has begun to recover (**Fig. 1**).

In the computer (IT) industry also, some enterprises are conducting business reconstruction in the midst of IT deflation and showing signs of recovery. For example, at NEC in 2001 and at Fujitsu from 2001 to 2002, drastic cuts were made in the workforce, causing severe suffering. Despite this, in 2003 both companies successfully returned to profitability in terms of sales and net profit.

With the pickup in the economy, the IT industry is also regaining its health and strength.

Nevertheless, we feel that the present trend toward recovery is following an unconventional pattern. This is a matter on which I would like to share my thoughts.

2. Globalization of Technology and Manufacturing, and Its Effect on Japanese Industry

In recent years, we have seen the rapid development of China's manufacturing industry, resulting in China being regarded as the "Factory of the world" with a significant increase in its output volume of products such as PCs, servers, mobile phones, and home appliances. By contrast, Japan's manufacturing industry has lost its previous vitality and its growth has become sluggish. In other words, manufacturing has shifted from Japan to China .

One factor contributing to this is the extreme difference in labor cost between Japan and China. If two countries are capable of making identical products, the world will choose the one with the lower labor cost as the manufacturing site. Reports in newspapers and other media increasingly reflect the viewpoint that China is now the hub for technologies and manufacturing in a variety of fields (**Fig. 2**).

In line with this trend, Japanese industry is now shifting its focus to service businesses. While the
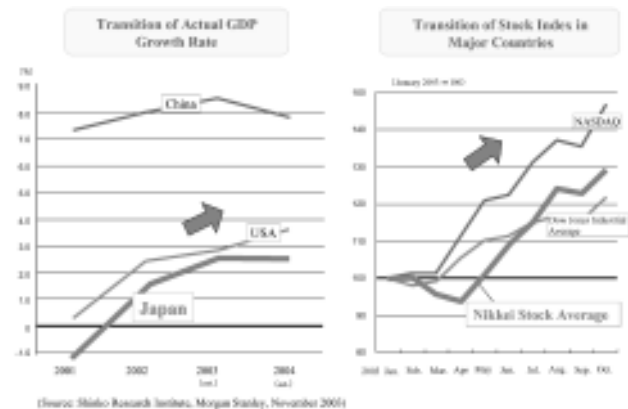

Fig. 1 Trends of economic recovery and the IT industry.

Fig. 2 Articles on China's threat, industrial structural changes.

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number of employers in manufacturing continues to drop, that in service businesses is growing. Thus, the "service economy" is gaining momentum. However, from the aspect of maintaining and running the country, I question whether it is best for Japanese industry to continue following this trend.

As a result of hard work in the past, the Japanese have managed to accumulate total personal assets of as high as 1,385 trillion yen (as of June 2003). However, if resources and materials continue to be procured from overseas while sales rely primarily on domestic consumption, it is expected that in 10 years Japan will experience a trade deficit and the personal assets of the Japanese will be exhausted. Japan will become poorer and poorer with only a service-based economy. In other words, today's industrial structure, which is based on "giving up" manufacturing, could lead Japan to national ruin.

Taking all factors into account, I believe that Japan must utilize its wisdom combined with innovation to continue the development of manufacturing using the advanced technologies.

3. Signs of Japan's Recovery as a "Technology Nation" and Manufacturing Superpower

(1) Recovery as a nation focused on science and technology and the Japanese government's IT strategy

In a "White Paper on Manufacturing Infrastructure" issued in June 2003, Prime Minister Koizumi declared the aims of revitalizing Japan as a science and technology nation and of winning back Japan's position as No. 1 in the fields of technology and manufacturing (**Fig. 3**).

At the same time, "e-Japan Strategy II" was launched as the IT strategy of the Japanese government, and forms the basis on which IT utilization is now being promoted and implemented. In 2001, Phase 1 of the "e-Japan Strategy" (**Fig. 4**), was announced when Japan was still regarded as a backward country in terms of IT. The announcement of this strategy was the starting point of the plan to make Japan the world's most advanced IT nation within five years. Phase 1 facilitated expansion of the Internet network and helped lead to an explosive increase in Internet users. In July 2003, the government announced "e-Japan Strategy II" as Phase 2 (**Fig. 5**) to promote IT utilization in the following seven areas: medical, food, living, financing for small and medium size businesses, knowledge, work and labor, and administrative services, with the aim of being the first country in the world to realize the age of ubiquity.

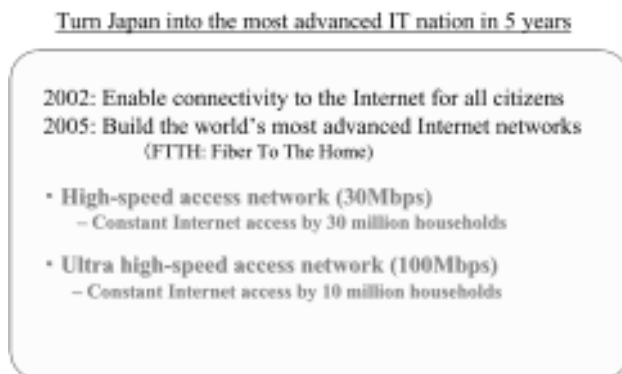**Fig. 3 Recovery as a "Science & Technology Nation."**

Fig. 4 IT strategy of Japanese Government; Phase 1 "e-Japan Strategy" (implemented Jan. 2001).
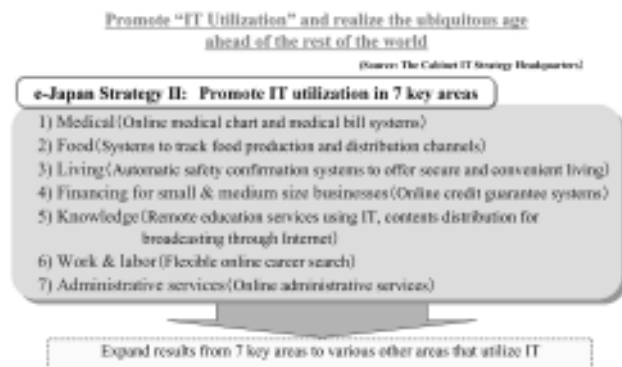

Fig. 5 IT strategy of Japanese Government; Phase 2 "e-Japan Strategy II" (implemented July 2003).

In addition, Japan is today facing the problem of an aging society. In preparation for the future increase in the number of elderly people living alone, the government is considering development of a system capable of monitoring the condition of elderly people from outside their homes to prevent problems or to handle problems promptly when they occur.

In light of the above, NEC, aiming to be the leader in the age of ubiquity, is developing an electronic medical chart system as an example of IT utilization.

NEC's electronic medical chart system uses an NEC-made tablet PC, which enables handwritten input with a pen to be conducted as easily as if one was writing on a paper medical chart. Sketching and calculations can also be accomplished easily.

With a wireless communication function in the tablet PC, physicians can use the electronic medical charts anywhere, facilitating the practice of medicine.

(2) The strength of Japan's technological skills

As mentioned above, China's manufacturing industry is expanding. However, individual key devices used in Chinese-made products are in fact primarily manufactured in Japan. For example, the pickup components of optical disk players such as popular DVD players are almost made in Japan. Currently, in the field of digital home appliances, the demand for DVD players and LCD televisions is rapidly expanding, and the production volume of components used in these products is therefore increasing significantly. In addition, the government has appropriated a 200 billion yen budget for terrestrial digital broadcasting, which became available in some parts of urban areas in Japan in December 2003. It can be said that the recovery of Japan's technological skills started with the growth of such digital home appliances.

(3) NEC's Strategy

In 2002, 80% of NEC's sales came from sales of hardware (including computers, mobile phones, network equipment, semiconductors, devices). NEC manufactures mass-produced products (global standard products) in China and technology-leading and brand-enhancing products at its domestic plants. Domestically manufactured products include supercomputers, high-end servers, high-tech PCs, 3G mobile phones and others. NEC is striving to further increase distribution of these products so that they will act as key elements in our development of global business (**Fig. 6**).

In the field of supercomputers, the NEC-produced Earth Simulator* achieved the undisputed record for the world's fastest speed. In the United States, there

Fig. 6 NEC focuses on sophisticated technologies; Ex. Supercomputers, high-end servers, high-tech PCs, 3G mobile phones.

is talk of "the Japanese supercomputer that surpassed American supercomputers," resulting in a push to develop an even more powerful supercomputer with the aim of beating Japan.

In addition, our IPF server using an Intel processor set a number of world records, and one of our storage devices, which are indispensable for storing image contents in a broadband environment, realized the world's top performance. Furthermore, our writeable DVD won the largest market share in the world, and the Express5800/ft server, a low-cost, high-reliability server based on open technology, received various prizes in world exhibitions in recognition of its leading technology, making it a winner of five top-level prizes.

Meanwhile, an "LCD-integrated silent eco-PC" has been developed based on environmental issues raised during the past several years. It is highly appreciated in facilities such as libraries and hospitals for its low noise feature and won the "Energy Conservation Award for 2002."

Due to the future need for longer-lasting batteries for mobile equipment including notebook computers, the development of fuel batteries is advancing rapidly. As a matter of fact, the person who discovered carbon nanotube and carbon nanohorn as core

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*The "Earth Simulator" was developed by the Earth Simulator Research & Development Center, a joint development team operated by staff from the National Space Development Agency of Japan, the Japan Atomic Energy Research Institute, and the Japan Agency for Marine-Earth Science and Technology. NEC produced the Earth Simulator under a consignment contract with the initiative of the Earth Simulator Research & Development Center.

technologies for fuel batteries is Dr. Sumio Iijima, Senior Research Fellow of NEC Corporation. He is now widely regarded as a candidate for the Nobel Prize (**Fig. 7**).

As already mentioned, NEC presently has a line of products with a dominant world market share including servers, personal computers, and mobile phones, and locates its centers for technology development and manufacturing in Japan. In the future, we will work to develop more digital-related technologies and increase domestic production to realize a more prosperous Japan.

4. Diffusion of Broadband and 3G Mobile Phones

"Broadband" & "Mobile" are current buzzwords in IT technology.

The prime feature of broadband is that it can offer high-quality (high-definition) moving images far superior to those of ISDN. In the future, high-level definition will be an essential element in the popularization of moving image use in communications.

Some have said that Japan had a late start in the construction of broadband infrastructure. However, in recent years, Japan has advanced at a rapid pace in this area and is now leading the world in terms of "cost" and "speed" (**Fig. 8**). Today, compared with the United States, broadband is much more widespread in Japan. In the United States, population density is low because of its vast area, so the cost per person of laying fiber-optic cables is very high. Also, there are disputes and rivalries between cable TV companies and local telephone companies. These are the main two reasons for the slow spread of broadband in the United States. Meanwhile, in line with the Japanese government's e-Japan Strategy, the laying of fiber-optic cables has been promoted throughout the country.

The hottest topic related to 3G mobile phones today is the TV broadcast function. NEC has successfully developed and released a mobile phone capable of receiving TV broadcast ahead of other companies. Now, an unprecedented 3G world can be experienced, and this is an essential technology in the age of terrestrial digital broadcasting.

According to NEC's forecast, in 2005 the diffusion rate for 3G mobile phones will reach 56% in Japan with the rest of the world at only 10%. Consequently, we can expect that Japan will also become the world's leader in the popularization and utilization of mobile phone (**Fig. 9**).
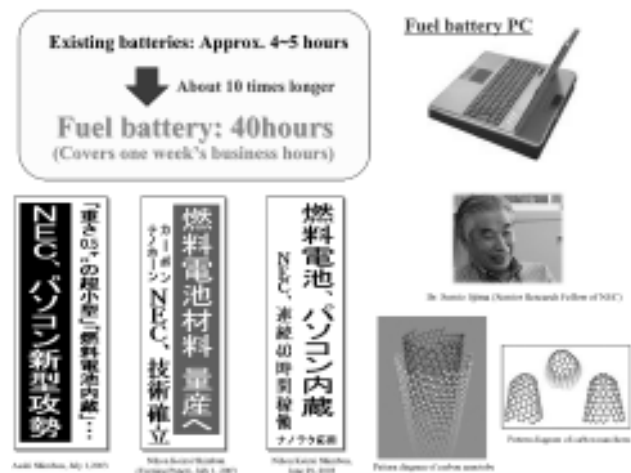

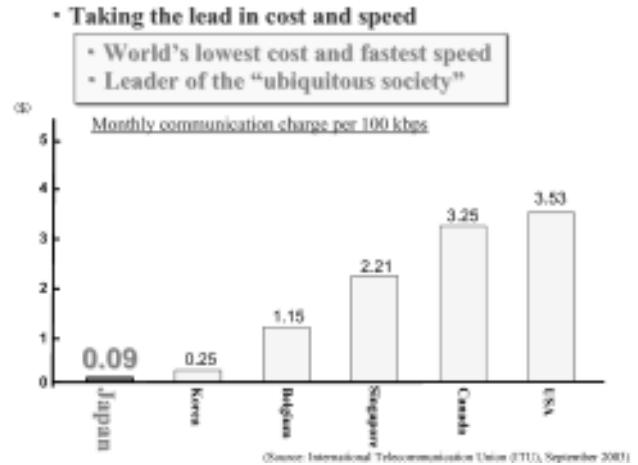
Fig. 7 Fuel battery PC (marketing planned for 2004).

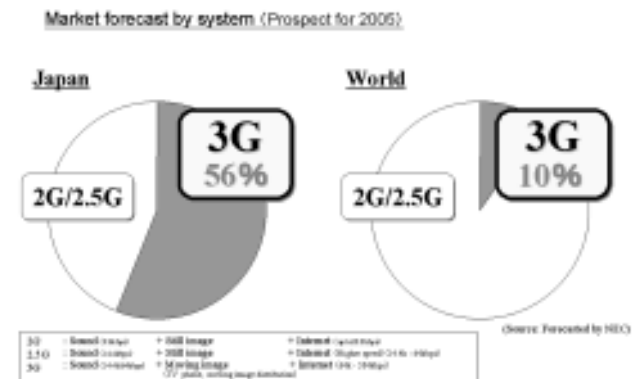**Fig. 8 Status of broadband infrastructure construction.**

Fig. 9 Forecast for 3G mobile phone diffusion.

5. Realization of a Ubiquitous Society

(1) Aims of a ubiquitous society in Japan

A "ubiquitous society," the active utilization of broadband and mobile in society has recently become a topic of public interest. The definition of a ubiquitous society is "a society in which work, communication, and interaction can be done anytime, anywhere, and by anybody through computers and networks." Wherever people are — in hospitals, stations, houses, trains, offices, airplanes, hotels or other locations — they can communicate with others through personal computers and mobile phones and can conduct business by accessing information on computers.

Becoming the world's leader in ubiquitous technology will have a significant impact on the future of Japan. First, by swiftly building and taking full advantage of a ubiquitous environment, Japan's intellectual productivity will improve and its competitive strength will be enhanced. Second, Japan will consistently increase its profits by developing related equipment ahead of the rest of the world, broadly distributing such products globally, and continuing to develop and release further improved products based on the products already in the market.

(2) "Work style innovation" through ubiquitous technology

Innovations in work styles can be realized through utilization of ubiquitous technology. The keywords are "Office-free" and "Engineering Collaboration."

‡@ Office-free

Office-free means "office work can be done anytime and anywhere." In other words, wherever you are, whether at a remote office or on a business trip, you can conduct a business meeting and share high-definition images, document data, and audio data in real time just by using a terminal. This is the kind of system NEC is working to develop (**Fig. 10**).

‡A Engineering Collaboration

Engineering Collaboration means "technology development is done by a team consisting of engineers who are at their respective workplaces and connected by ubiquitous networks, instead of bringing all the engineers together in one place."

In June 2002, NEC introduced the concept of "Dynamic Collaboration." Another word for "collaboration" is "cooperation in business." A specific example of Engineering Collaboration is shown in **Fig. 11**. Through sharing applications both internally and externally and making full use of a ubiquitous environ-

ment, engineers can advance technology development in real time anywhere, any time.

6. Technologies and Products in a Ubiquitous Society

With the progress in infrastructure building and technology development, the realization of a ubiquitous society is in sight. NEC will work to develop new products in preparation for this forthcoming age.

In particular, the terminal equipment required in a ubiquitous society needs to be developed first, including tablet PCs, notebook computers, telephones on PCs, and 3G mobile phones. We are committed to making every effort to commercialize terminal equipment having designs that are highly-sophisticated and user-friendly.

At the Tablet PC Show in New York, Mr. Bill Gates complimented us by saying "NEC's tablet PC is consistent with the concept that we have had in
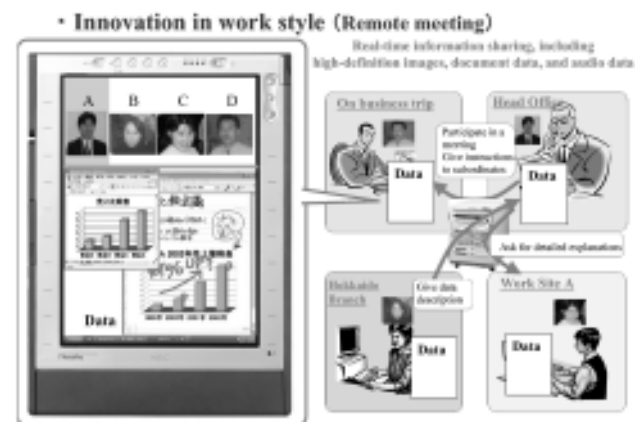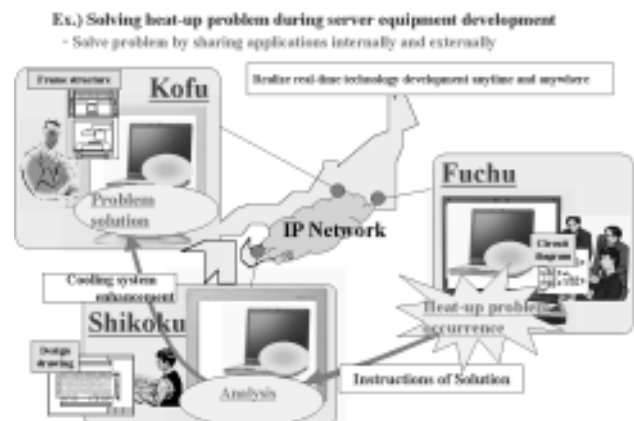

Fig. 10 Office-free.

Fig. 11 Engineering Collaboration.

mind." The chairman of Hewlett-Packard Co., our business partner, looked chagrined and said, "We always consider NEC to be our good friend, but today they are our rival." For that reason alone, we are proud of our light, thin, and wireless LAN-capable tablet PC.

In addition, due to the relatively high phone rates for 090 mobile numbers compared to the cost-free usage of IP phones, NEC is considering development of a "handset that automatically operates as a 090 number mobile phone outside the office and as an IP phone inside" (**Fig. 12**). The development of terminal equipment capable of using multiple technologies will significantly contribute to the expansion of a ubiquitous society.

Furthermore, we are focusing on the development of a VoIP server, which will be commercialized under the name "UNIVERGE" in the future. (**Fig. 13**) For this server, we are aiming to achieve high voice quality and enhanced security to avoid risks like eavesdropping.

7. Japanese Sensitivity and Culture, and Japan's Course toward the Ubiquitous Age

Up until now, the world of computer/communication technology has been a digital world based on ones and zeroes. In other words, humanity is hardly involved in that world. However, we predict some changes in the coming ubiquitous age. This is due to our belief that the ease and convenience of handling equipment will become an important factor in attracting users. The Japanese especially have a rich imagination and are highly sensitive. Therefore, I believe that making the most of the sensitivity and cultural values of the Japanese will be the key to success in the future.

Ms. Ringo Shiina, a Japanese pop musician, made the cover of the August 11, 2003 issue of TIME ASIA with the cover title: "JAPAN RULES OK!" (**Fig. 14**). The point of the title is that hitherto, the rules of the world have been dictated by America. The global standard is the American standard. This is reality. Now, however, the Japanese standard is about to take over. Japan will be in charge of dictating world rules from now on. Is that OK?

In the same issue of TIME ASIA, journalist Douglas McGray advocated GNC (Gross National Cool) as an economic indicator to replace GDP (Gross Domestic Product). "Cool" is used to describe the aspects of Japanese culture that appeals to the world. In his 21-page feature article titled "Japanese Cool (i.e. What's Cool in Japanese Culture)," he writes that in the
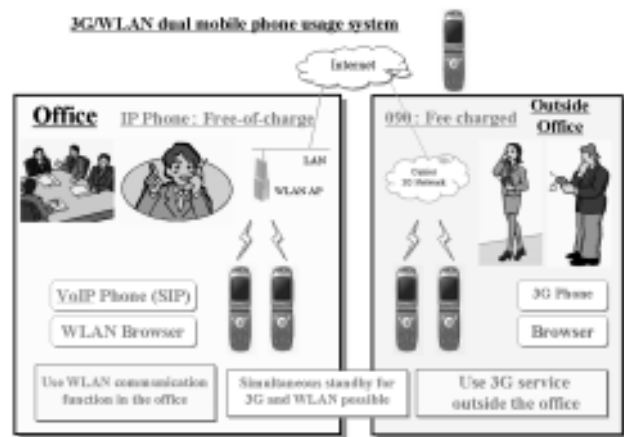

Fig. 12 Realization of smooth, seamless, high-speed Internet anywhere.
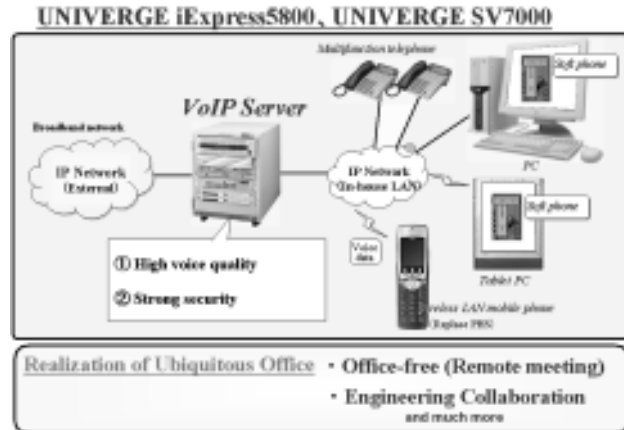

Fig. 13 VoIP server to support ubiquitous environment.

Fig. 14 Cover of TIME ASIA (Aug. 11, 2003 issue).

future, Cool Japanese Culture will be a key to successful business and will help Japan conquer the world market.

We often hear the term "the lost decade," which refers to the idea that Japan has wasted the last ten years. In culture-related industries, however, Japan has maintained significant growth and as shown in **Fig. 15**, the export value of Japan's culture-based products expressing Japanese Cool has tripled during the past ten years. A typical example of such products is Japanese animation. Today, 60% of the animations distributed worldwide are made in Japan. For example, *Pokemon* has fascinated children in over 65 countries to date. Japanese computer games also hold 88% of the world market share. Japanese fashion and music have a big impact on Asian fashion. The reason why Ms. Ringo Shiina was chosen for the cover of TIME ASIA was that she is recognized as a Japanese musician who creates a unique and original aura while sticking to the basics of pop music. Of course, in the end, no price can be put on the value of the positive appeal for Japan brought by this Japanese Cool.

I don't think Japanese Cool, ubiquitous society, and technologies should be unrelated to one another. Rather, I want to find a way to link them. By harmoniously blending them together, I hope to see the realization of ubiquitous products and technologies making the most of Japanese Cool.

As mentioned earlier, Japan has strength in the areas of technology development and manufacturing. And today, Japanese Cool is seen as a threat to America. In reality, Japanese fashion and pop culture are already expanding into Asia. I believe it will be possible to give Japan new strength and open a way to its revitalization if Japanese Cool is successfully linked to technology and manufacturing.

For that purpose, the government should invest adequate funds in broadband and mobile and further promote infrastructure construction. Not only NEC's engineers but all engineers throughout Japan should strive to create superior products and aim to make Japan the leader of the forthcoming age of ubiquity, as NEC's President Kanasugi has suggested.

8. Conclusion — Summary and Challenges for the Future

We often hear consumers' say things like, "We already have enough things. There is nothing else we want to buy." and "Even if there are great products
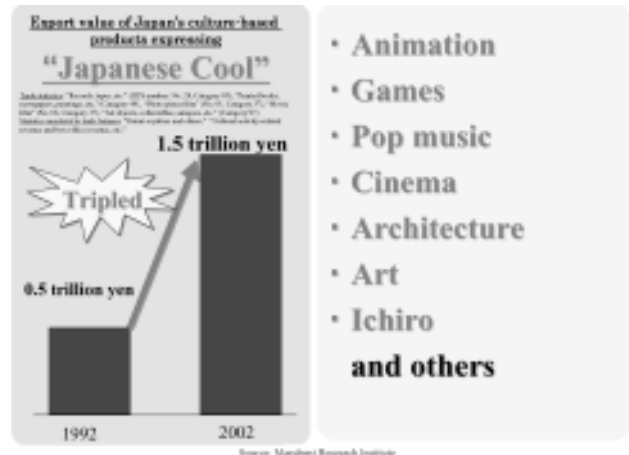

Fig. 15 Growth of Japanese cultural indus-try.

using superior technologies, we don't want to buy what we're not going to use." We believe it our task to find ways to nurturing people who have the ability to devise products that people want to buy, and we will strive to do so. Technology development often requires the efforts of more than just one company. Therefore, it is typical to have multiple companies in the IT industry working together to advance technology development. It is also natural for engineers to seek opportunities to interact with customers in order to find out what they want. But on top of that, we need to continuously create truly novel products with a concept like "Japanese Cool," while developing deeper relations with people of other cultures. It is my conviction that we must further expand the range of our collaboration efforts.

After "the lost decade" we are finally seeing some signs of recovery in the Japanese economy. The whole nation is working toward revitalization of the manufacturing sector and our standing as a science and technology nation. Through the strengthening of the fields of technology and manufacturing and the blending of Japanese culture - Japanese Cool - into them, Japan will regain its power. Bearing this in mind, NEC will do its best to make positive contributions to this effort.

As always, we appreciate your continued cooperation and support for our business activities.

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