Japan's IT strategy for 2010
- a ubiquitous network society

Andreas Göthenberg, ITPS, Tokyo

In early 2006, Japan presented its new IT strategy. Earlier strategies had focused on developing the infrastructure for the IT society and effective utilization of IT.

The goal of the strategy is to create a new society where IT becomes an integral element for solving the social and economic challenges that Japan is facing.

This is to be achieved by realising a ubiquitous and universal network society which enables secure communications between everyone and everything, everywhere, always, and for all purposes.

The ubiquitous network society in Japan is expected to lead to growth and innovation through the renewal of social and economic systems. The new IT strategy contains a vision of a future society that benefits from the advantages of information technology.

The aim of this text is to describe Japan's goal oriented initiative in creating a ubiquitous network society.

The goal of the New IT Reform Strategy is to realise a ubiquitous and universal network society, where anyone, anywhere, will be able to benefit from the advantages provided by IT at any time.

Ubiquitous has also become a term familiar to the average Japanese citizen. Twenty four percent of the Japanese are aware of its meaning.

Introduction

The Japanese IT Strategic Headquarters presented in the beginning of 2006 its New IT Reform Strategy (IT Strategic Headquarters 2006). The headquarters are part of the cabinet and the prime minister is the chairman.

The goal of the New IT Reform Strategy is to realise a ubiquitous and universal network society, where anyone, anywhere, will be able to benefit from the advantages provided by IT at any time and for any purpose.

The reform is a continuation of the earlier IT strategy, the e-Japan strategy, which was concluded in 2005. This had as its first goal to develop the infrastructure for the IT society. The result was a transformation from low speed and low capacity to broadband with its high capacity and high speed. The second goal was to make IT usage more effective.

Now that these two goals are considered to be implemented to a large extent, a new society is to be built. IT will be an integral part of the society for solving the challenges that Japan is facing, namely a declining and ageing population and the ambition of becoming the world's safest and most secure country.

The term ubiquitous

The first time the term "ubiquitous" was used as a new paradigm in the IT area was in 1988. Mark Weiser at Xerox Palo Alto Research Center (PARC) coined the term "ubiquitous computing". However it didn't appear in Japan until 1991, and then only briefly when Weisser's article in Scientific American was translated into Japanese (Weiser 1991).

During 1999 articles on ubiquitous computing started appearing, but as a contrast to this, a new concept was created in Japan by the think tank Nomura Research Institute. The concept was ubiquitous network, which focuses on complete accessibility to networks and the Internet everywhere, for everyone, and at any time. It differs from Weiser's idea by focusing on strengthening the global competitiveness of the Japanese IT industry (Murakami 2005).

The term ubiquitous started to gain wider recognition around that time and the daily newspaper "Nihon Keizai Shimbun" launched its "Global Information Summit 2001" under the slogan "Launching the Era of the Ubiquitous Network" (GIS 2001).

In addition to the use of the concept by industry, ubiquitous has also become a term familiar to the average Japanese citizen. A study was carried out in March 2005 which showed that 24 percent of the Japanese were aware of its meaning.

It should be noted that there are subtle differences between ubiquitous and other terms used such as pervasive and ambient. The intention of this article is to describe Japan's initiative in creating a *ubiquitous network society*.

Ubiquitous network

The ubiquitous network is an information and communication network that enables users to safely and easily use network terminals to access digital content, anytime, and anywhere without even having to think about how they are accessing it. This makes communication possible everywhere between individuals, between individuals and objects, and between objects, as it realises universal communication without boundaries.

The trend in IT development has gone from many users sharing one computer resource, via personal computers, to the situation we have today, where each individual is surrounded by a number of digital systems with embedded computers (Figure 1). Digital convergence, which means that the boundaries between digital communication technologies, computers, and digital media are decreasing, allows digital devices to communicate with each

other and thereby making the ubiquitous network possible.

Individuals can benefit from application areas such as communication, health care, entertainment, and security being interconnected to each other (Figure 2) (Ito 2007).

The ubiquitous network society

The ubiquitous network society, which Japan is aiming for, with a ubiquitous network providing full coverage, is considered to have the potential to integrate a number of different social functions through the network, since information and communication technologies (ICT) will penetrate all social and economic activities. For this reason the ubiquitous network is expected to contribute to growth and innovation in all social and economic areas through renewal of the social and economic systems. It will also lead to accelerating technological progress, which is considered to be the source of a dynamic economy.

New IT Reform Strategy

In order to continue achieving economic welfare and raising quality of life, the social infrastructure in Japan which until now has been based on the industrial society of the 20th century, is

Figure 2 Ubiquitous network.
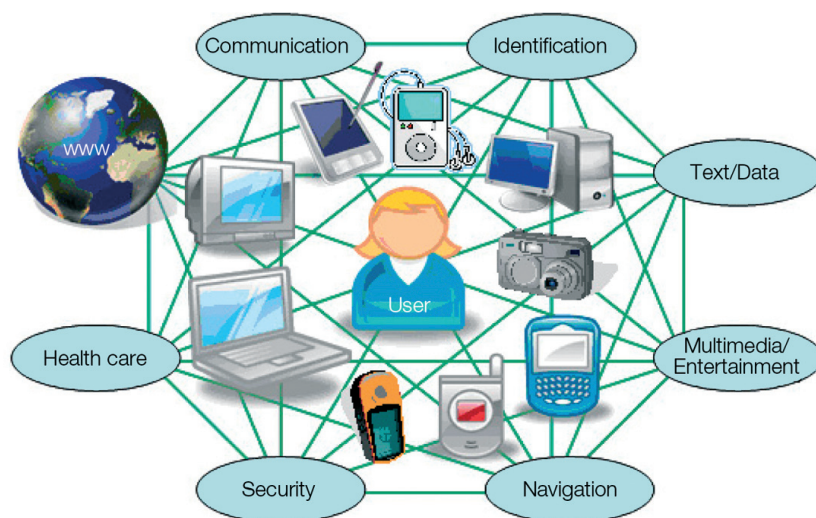
Source: Ito (2007)

being transformed into an information oriented society where information and knowledge will be the foundation for growth. Given this aim, Japan has adopted the IT Basic Law and different strategies such as e-Japan. The ambition is to turn Japan into the world's leading IT country. As a result of the conclusion of the e-Japan strategy in 2005, Japan has now moved into a new phase where the goal is to solve the serious problems brought about by Japan's ageing and rapidly declining population. This involves structural

reforms in order to maintain economic welfare and the realisation of a safe and secure society with high quality of life for all citizens.

In addition, there is also an ambition to achieve a small state apparatus with small authorities and continued raising of the industrial level. The economically powerful society, which Japan is striving for, is to be achieved by full exploitation of IT technology and creation of a ubiquitous network society.

Communication networks in this context become a necessary element, not just between individuals, but also between individuals and objects and between objects. One example of communication between objects is the growing importance of logistical management. In order to achieve this, necessary technology and cost reduction is being promoted at the same time as personal data must be protected. The goals set up in the new IT strategy reform are the following:

1. 2010 – Improvement of infrastructure to cover all areas which today do not have access to broadband. To implement this, incentives are given to the

Figure 1 Development of IT from mainframe to embedded computers.
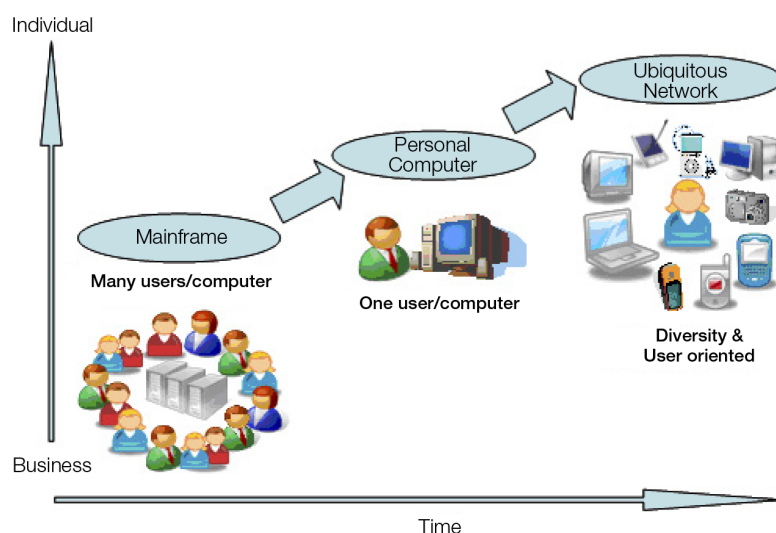
Source: Ito (2007)

The aim is to get 80 percent of the population to agree that IT is useful for solving daily problems. Another goal is that 80 percent of the citizens should feel safe using IT.

The fact that the boundary between telecommunications and radio/TV broadcasting is diminishing is expected to lead to a new leading industry and is also forecasted to contribute to disseminating Japanese culture over the world.

private sector, accessibility to regional public networks through common use, development of new infrastructure and networks, the realisation of new radio system such as wireless broadband (UWB) and power line communications (PLC).

2. 2010 – A mobile communication system with data transmission 100 times faster than today will be realised. In order to develop this, Japanese industry, universities and the state are urged to co-operate in order to take advantage of the competence in mobile communication technology and R&D. The new system is to be internationally compatible through the use of international standards.

3. July 2011 – Complete transition to digital terrestrial broadcasting though harmonisation between telecommunications and radio/TV broadcasting.

4. 2010 – Technology which provides rapid and safe authentication from ubiquitous terminals, not least protection of personal data.

5. 2010 – A network of 10 billion ubiquitous terminals (incl. RFID-tags), which can be used simultaneously.

u-Japan

The Ministry of Internal Affairs and Communications (MIC) is the ministry that has taken the first step towards an IT reform strategy. MIC inaugurated the u-Japan Policy Roundtable in March 2004. For 10 months, the strategy, the IT industry and usage were discussed.

The u-Japan concept stands for ubiquitous Japan, or more popularly: *"Ubiquitous, Universal, User-friendly, Unique, 4U = for you."* In order to become the world's most advanced country in IT by year 2010, u-Japan has the following three fundamental ambitions (MIC 2006a):

1. Development of a ubiquitous network. The development of the infrastructure has so far mainly focused on fixed connections, such as ADSL

(asymmetric digital subscriber line), Internet via cable and optical fibre. The u-Japan policy promotes a seamless network that covers all of Japan where people can use services without needing to be aware of the network, irrespective of whether it is a fixed or wireless connection, such as mobile networks and wireless LAN (local area networks).
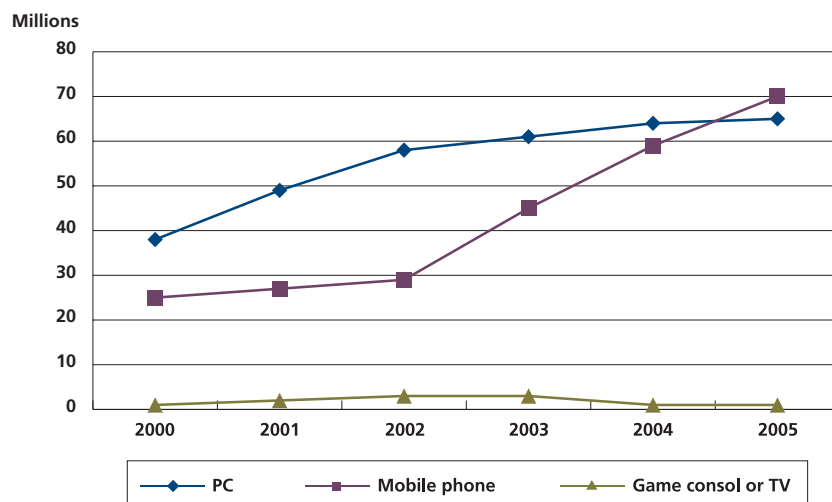
Digital terrestrial broadcasting of radio and TV, as well as transport networks which facilitate safe transport through the use of ITS (intelligent transport systems) are also given high priority. The goal of developing real object networks is also included in the strategy. A real object network connects to network devices which include objects that never had any previous relevance to networks at all, such as refrigerators, curtain rods and beef, for instance. The real object network makes these objects into a part of the network by means of IT components such as electronic tags, sensor networks, network robots, etc.

2. Improving the utilization of IT. So far, the focus has been on making information accessible. Under u-Japan, social problems such as declining birth rates and the ageing population will be solved. Here the aim is to get 80 percent of the population to agree that IT is useful for solving daily problems.

3. The user environment. Since IT has penetrated deep into people's lives, there is an increasing concern about integrity and information security, as well as the possibility that new and unexpected threats may materialise. Work is proceeding at establishing a protected society where 80 percent of the citizens feel safe using IT.

Based on these three ambitions, Japan is attempting to create a society where IT has deeply penetrated citizens' lives and where effective use of IT creates additional value for its citizens.

Figure 3 Number of users for various Internet terminals in Japan.
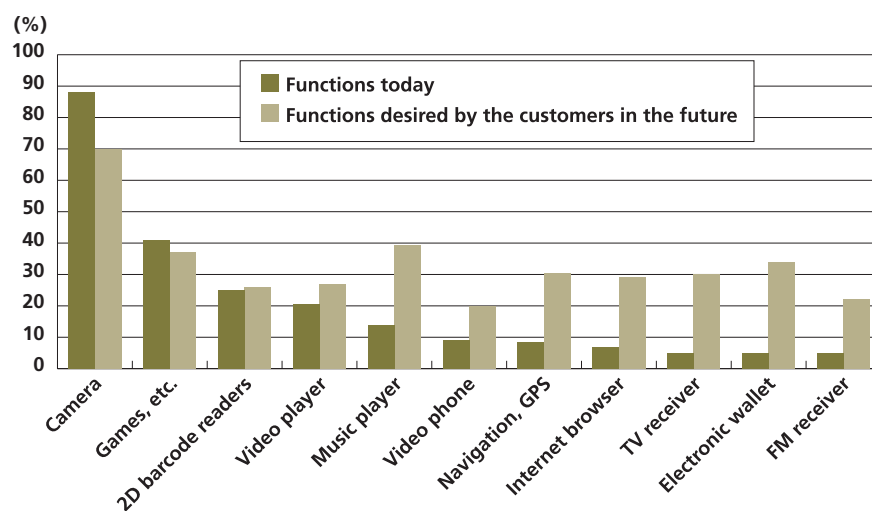

Source: MIC (2006c)

effective markets and globalisation of trade, improvement of information searching and retrieval is addressed, enabling users to more easily find precisely what they are looking for.

Mobile IT terminals will play the central role in the ubiquitous network society (Figure 3). The success of mobile IT terminals will not only depend on the functions of the terminals, such as communication and music, but also their popularity, and the contents and services they provide.

Mobile IT terminals cover everything from cellular phones to digital music players, portable computers, and so on. Integration of these functions is already under way in the development of the next generation of these products (Figure 4).

The fact that the boundary between telecommunications and radio/TV broadcasting is diminishing is expected to lead to a new leading industry which will contribute to increasing growth, by amongst other things more powerful transfer of information and improved production of contents. This is also forecasted to contribute to disseminating Japanese culture over the world,

Ubiquitous economy

In contrast to the 1990s when the development of IT and networks was primarily adopted by companies and industries, it is assumed that a ubiquitous network society will cover all areas, including individuals and households. It is further assumed that this will occur as a consequence of new contacts created directly between companies and individuals, or between manufacturers and consumers, and that this may have a major impact on social and economic activities and relations.

Users' needs are expected to grow in Japan as a result of a diminishing border between communication and radio/TV broadcasting. In addition, sales of products with low demand will be improved through direct network transactions between manufacturers and consumers through Web 2.0. The increase in consumer generated media (CGM), such as blogs and social network services (SNS), is forecasted to increase knowledge and dissemination of views in a society where everyone has the opportunity to share information at a low cost. The development of networks contributes to making a greater amount of knowledge accessible, at the same time as co-operation is stimulated, thereby leading to improved productivity throughout society.

A clear example of this is the development of "open source". Here we can see how open source has contributed to the development of Web 2.0 thanks to the rapid growth of co-operation mediated by network dissemination. The development of intellectual property (IP), such as software, is assumed to grow radically through ubiquitous network since people with a range of different knowledge and expertise will find it easier to co-operate. In order to strengthen competitiveness, more

Figure 4 Mobile services and handset functions.

Source: MIC (2006b)

In Japan, the highest priority area in IT is to develop the world's fastest supercomputer.

Signs indicating that ubiquitous network has become a global concept were first observed in South Korea.

as a continuation of Japan already becoming popular in global youth culture. From the user's side, this means that technical innovations in this area will provide access to a wide range of services.

Ubiquitous network and its impact on the labour market

The network is expected to reduce the costs of announcing new job opportunities and also making the employment/recruitment process more efficient for both parties, which should lead to more successful recruitment. With greater insight into their own value, employees will probably become more influential. Tele-working will be less limited to specific places and times, but also that the labour market could be broadened to encompass those individuals who are outside of it.

Regarding routine work, MIC considers that the Internet and personal computers have not led to any reduction, but in fact the opposite.

Research and development

Japan is experiencing the impact of intensified global competition in technological development, which now also includes other Asian countries, such as China and South Korea. Japan feels hard pressed by its neighbours'

efforts to strengthen their own competence in technology.

In order to maintain its competitiveness in advanced technology and develop the foundations for the new IT society, Japan is investing in strategic research and development (R&D). In co-operation with the Council for Science and Technology Policy, the IT Strategic Headquarters is formulating the short-term and long-term technological strategies and priorities for the next generation of information technology. The council supports a broad spectrum of R&D to achieve a ubiquitous society. This includes future oriented basic research for the next generation of supercomputers, applied empirical research in the use of robots to assist in daily tasks, as well as Next Generation Network (NGN).

In Japan, the highest priority area in IT is to develop the world's fastest supercomputer (Abé 2006). Japan is also investing in the underlying technologies such as semiconductors and nanoelectronics (CSTP 2006).

In order to maintain and strengthen Japan´s global competitiveness, the new IT strategy reform will also intensively promote R&D. The areas given particular attention are, amongst others, ubiquitous terminals, RFID tags, optical networks, robots, core devices,

Figure 5 Market related to ubiquitous network in Japan.

Yen (10^{12})

Legend: Infrastructure, Network, Equipment, Platforms, Service/content, Commerce
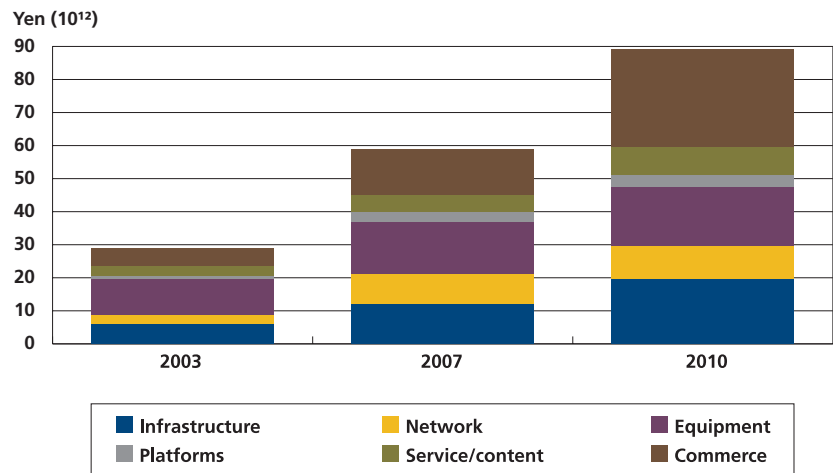
Source: MIC (2006b)

information appliances, mobile technology and audiovisual interfaces for user friendliness. R&D in IT security is also being promoted in order to protect the ubiquitous society against the risk of computer viruses and cyber terrorism.

Japanese industry

The Japanese industry began to use the term ubiquitous already in 2001. Initially, it was in connection with the launch of new products at trade fairs and similar events, but an assumption is that companies would also have initiated research and development in the area at that time. This was confirmed when Hitachi, Sony and Nihon Unisys in April 2002 acknowledged that they had established new departments focusing on ubiquitous: Ubiquitous Solutions Headquarters and Ubiquitous Platform Systems (Hitachi), Ubiquitous Technology Laboratories (Sony) and Ubiquitous Business Center (Nihon Unisys).

Shortly thereafter a number of other Japanese companies started their own organisations to work in the area (Murakami 2004). This trend has continued and the number of IT companies in Japan not active in the ubiquitous area is in the clear minority. The market related to ubiquitous network is expected to grow to 500 billion Euro (87.6 trillion Yen) by year 2010 (Figure 5).

Other parts of Asia

Signs that ubiquitous network have become a global concept were first observed in South Korea. During 2004 the "Ubiquitous IT Korea Forum" was organised. The forum consists of 50 member companies, universities and research institutes, all of which are involved in ubiquitous IT.

In the same year, South Korea presented new national strategies for information and communication, under the slogan "u-Korea Promotion Strategy". This is the South Korean government's tool for achieving the goal of creating a ubiquitous Korea (u-Korea).

Summary

Japan has long been one of the world's leading nations when it comes to innovation in the IT field. Today the country is at the leading edge in the development of ubiquitous network.

The view of technology in Sweden and East Asia differs, and this is clearly evident when the Japanese strategies are studied. In Japan, as in Korea, technical innovation is considered as a solution to the social and economic challenges the countries are facing.

Through its national e- and u-strategies, Japan has implemented new infrastructure and innovative services. One example is mobile networks, which have been a highly successful area thanks to close cooperation between state and industry. Japan is taking advantage of its strengths in areas such as mobile telephones and consumer electronics, and expanding its R&D within these areas. In order to stimulate the environment for ubiquitous network, Japan is also actively working with effective frequency allocation (ITU 2005).

Japan is not only creating technical and policy measures for the rapid and smooth development of a ubiquitous network society, but doing this very much from the user's perspective of technology and its overall social effects.

Here it is important to emphasise how Japan expects that the development of the ubiquitous network society is a solution to the social and economic problems the country is confronting, but also to enhance the quality of life for its citizens.

In order to realise this society, citizens must also be aware of their responsibilities and obligations in the ubiquitous network society. This will be achieved by secure handling of information and protection of personal data at the same time as the social framework ensures that the advantages will be of use for all citizens.

Japan's overall view of the impact of technological development on the future society and its economy should be a source of inspiration and experience, as we stand on the threshold of the future network society.

Growth policy outlook

Growth policy outlook presents short thematic articles on current issues relevant to economic growth. The content reflects ITPS activities in Sweden and abroad with articles written by ITPS analysts and other specially invited authors.

ITPS

ITPS is a Swedish government agency whose task is to provide a knowledge base for growth policies. ITPS studies the determinants of economic growth in Sweden and other countries, as well as evaluating policy interventions and providing official statistics.

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