Introduction

Developments of ICT Since 1973, the Year of First Publication of White Paper on Information and Communications

The Introduction compares the year 1973, when the first White Paper on Information and Communications[1] was published, with today, a time when information and communications technology (hereinafter "ICT") has become an indispensable social and economic infrastructure, from the viewpoint of advancement of ICT in various areas, such as education and medical care.

1. Advancement of ICT and Diversification of Services

In the 50 years since the first publication of the White Paper, **ICT has continued to develop, and various ICT services and businesses have appeared.**

In 1973, **the most essential communication tool was the subscription telephone**, while pay phones fulfilled an important role as a means of communication when one was away from home. Communications at the time were mostly voice calls **(Figure 0-1-1-1)**. Since then, the numbers of fixed phone subscriptions and pay phones have significantly decreased, and today's **major communication tool is** the **mobile phone**. In addition, **e-mail and social media (SNS) also prevail, and other** diverse communication tools and services using the alphabet and visual imagery in addition to voice have become widely used.

In 1973 people **viewed analog terrestrial broadcasting on televisions (Figure 0-1-1-2), while** today the development of imaging technologies has made it possible to view **satellite broadcasting and CATV broadcasting** in addition to **terrestrial broadcasting,** and also to enjoy super-high picture quality **4K/8K** videos. We can also enjoy online streaming services **(internet video distribution services) to view television programs on personal computers and mobile devices**.

Figure 0-1-1-1　1973 and today: changes in communication tools

Telephone
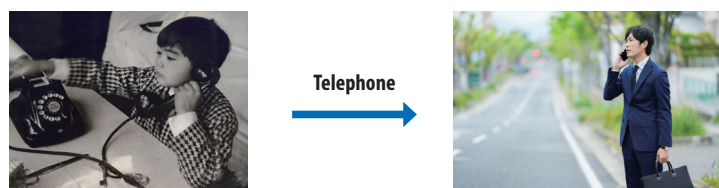
(Source) cocolog "a child making a call in the 1970s", Photo AC

Figure 0-1-1-2　1973 and today: changes in video viewing means

Television

(Source) Kamijima Digital Archive, InfoCom Research, Inc.

[1] The title was "Communications White Paper" in 1973 and has been "Information and Communications in Japan, White Paper" since 2001.

2. Penetration of ICT Use in Social and Economic Activities

With the advancement of ICT and the diversification of services, ICT has penetrated various areas of social and economic life.

In 1973, enterprises mainly processed information using general-purpose computers (mainframes) constructed within their own premises. Today, enterprises can share data and expand functionality without constructing internal information systems thanks to the development and spread of cloud technologies. The percentage of enterprises using cloud services, even if only partially, reached 70.4%[2] in 2021, and it is expected to further grow in the future.

The use of ICT in the field of disaster prevention/mitigation include the remote confirmation of damage at disaster sites through sensors and drones, and the use of GPS location information obtained through smartphones to grasp the status of local residents at the time of a disaster. For example, the Disaster Information for Rivers[3] website of the Ministry of Land, Infrastructure, Transport and Tourism enables website visitors to view footage from river cameras that are installed at about 6,000 sites across the country by using their smartphone, etc. Furthermore, people including victims of a disaster can post the damage situation in text, location information or photos through SNS and check the posting that is organized and visualized on a map by artificial intelligence (AI).[4] Location information from the smartphones through GPS is connected with the subscribers' attribute information including age and sex to visualize the flow and stay of people on a map.[5]

In the field of education, an in-school communication network environment has been rolled out in almost all elementary and junior-high schools across Japan and the use of personal computers or tablets in classrooms has spread under the GIGA School Program **(Figure 0-2-1-2)**. Private service provider initiatives include a solution named EdTech (Education × Technology) for educational institutions to reduce the burden on teachers through the streamlining of school affairs, online learning applications for individual users to provide education tailored to their learning and comprehension level, and applications and services that incorporate adaptive learning with AI to provide optimal learning opportunities.

Applications in the field of medical care include cloud servers through which cardiogram data is sent from ambulances so that doctors can view the data before patients arrive at hospital, and video call or other communication applications through which patients can remotely receive diagnosis and medication prescriptions from a physician. Telemedicine initiatives have been promoted to improve the quality of medical care and provide advanced medical care at isolated islands and remote areas. For example, a remote image diagnosis system has been installed in 1,486 hospitals and 1,820 clinics.[6]

Figure 0-2-1-2　1973 and today: fields where ICT has come to be used

Education　　　　**Medical care**　　　　**Agriculture**

(Source) Chiba City Fire Bureau, Niigata City Konan Elementary School, Photo AC

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[2] Sum of the respondents answering using cloud services "across the company" and "in some offices or departments" in MIC Communications Usage Trend Survey (survey as of the end August 2021) https://www.soumu.go.jp/johotsusintokei/statistics/statistics05.html

[3] Disaster Information for Rivers , MLIT: https://www.river.go.jp/index

[4] LINE, SOCial-dynamics observation and victims support Dialogue Agent

[5] KDDI, "KDDI Location Analyzer"

[6] MHLW, 2020 Static/Dynamic Surveys of Medical Institutions　https://www.mhlw.go.jp/toukei/saikin/hw/iryosd/20/

The agricultural field has seen the further development of smart agriculture with growth management using information from various sensors,[7] harvest robots using AI and pesticide spraying using drones.[8]

Damages to agriculture, forestry and fisheries caused by wild birds and animals have been serious issues. In fiscal 2020[9] the nationwide total of such damages was16.1 billion yen. Effective and efficient countermeasures taken by using ICT include sensor cameras to survey habitats and monitor damage, trapping using remote monitoring/control systems, and management of trapping data using smartphones or personal computers.[10]

Use of ICT has penetrated every corner of daily life, including using IC ticket Suica or PASMO based on Felica that is contactless IC card technology at automatic ticket gates and cashless payments using electric money through applications such as Rakuten Edy, WAON and nanaco.

As described above, compared with 1973, we can see that ICT has significantly developed, penetrated various areas of daily life, and become an indispensable social and economic infrastructure.

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[7] For example, NTT DOCOMO provides a service named ICT Buoys where users can check water temperature, salinity and other oceanographic data from sensors through smartphones and mobile phones. https://www.docomo.ne.jp/biz/service/ict_bui/

[8] https://www.affrc.maff.go.jp/docs/smart_agri_pro/smart_agri_pro.htm

[9] https://www.maff.go.jp/j/seisan/tyozyu/higai/hogai_zyoukyou/index.html

[10] https://www.maff.go.jp/j/seisan/tyozyu/higai/kikijouhou/kikijouhou.html