

Key Points of the 2019 White Paper on Information and Communications in Japan



Part 1

Special Theme: Evolving Digital Economy towards "Society 5.0"

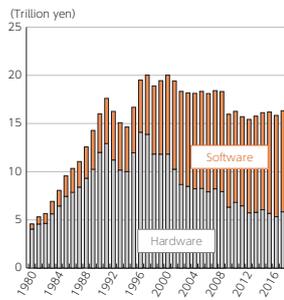
Chapter 1

How ICT and the Digital Economy Have Evolved (1/2)

(1) Evolving ICT Services and Changes in Companies' Use of ICT

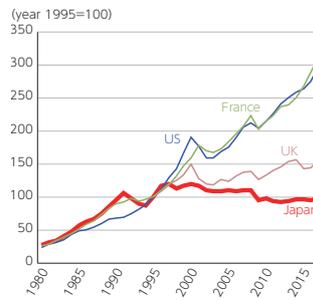
- Mobile phones and the Internet widely spread during the Heisei era. The spread was facilitated by regulatory reforms such as allowing mobile operators to sell mobile devices instead to rent them (1994).
- In the Showa era, some Japanese companies became pioneers of the development of online systems in the global market, but ICT investment remained sluggish during the Heisei era (Fig. 1 below). Growth in ICT investment in Japan was much slower than that in US and major European countries (Fig. 2 below).
- As a background factor, Japanese companies came to outsource online system development, which they considered to be outside of their core business, from the end of the 1980s until the 1990s. As a result, a unique structure under which ICT companies called System Integrators (SIs) developed information systems mainly on a contract basis, was formed in Japan (Fig. 3 below). Accordingly, in non-manufacturing industries, in particular, companies failed to introduce ICT that accompanies business reforms in a sufficiently effective manner, and this may have made companies less positive about ICT investment.

Fig. 1 Changes in ICT investment values in Japan



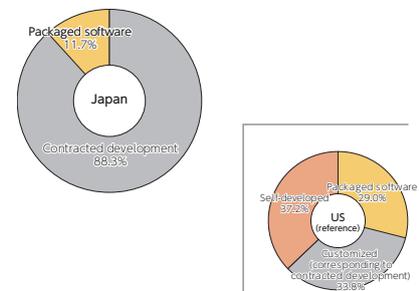
(Source) Created based on the "National Accounts of Japan" (Cabinet Office)

Fig. 2 Comparison of changes in ICT investment values



(Source) Created based on the OECD Stats

Fig. 3 Breakdown of software introduction

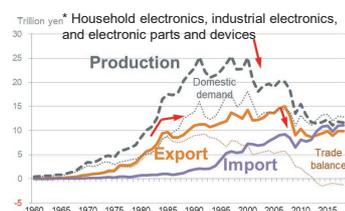


(Source) United States Department of Commerce

(2) Changes in the ICT Industry

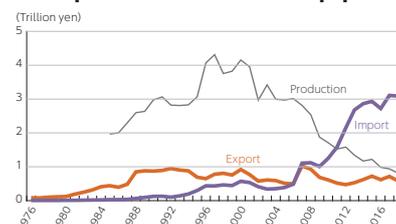
- The telecommunications business has developed significantly through active competition among diverse business entities since the telecommunications liberalization in 1985. The ICT manufacturing industry has also developed in such a manner as communications equipment manufacturers' businesses expanded into making computers.
- The monetary values of production and exports of ICT-related equipment had continuously increased and Japan used to be called an "Electronics-based Nation" until around 1985. However, growth in exports slowed down from 1985, and production and exports both shifted to a downward trend in the 2000s. In 2013, the import monetary value finally surpassed the export monetary value (Fig. 4 below). Looking at communications equipment, production peaked in 1997 and decreased thereafter, while imports increased sharply due to the spread of smartphones in the late 2000s (Fig. 5 below).
- As factors bringing about these changes, the following are pointed out: (i) production sites have been transferred overseas as countermeasures against the strong yen; (ii) Japanese-made switchboards were replaced by foreign-made routers due to the spread of the Internet; (iii) the existence of stable domestic customers (telecommunications carriers) has exerted a negative effect on motivation to market communications equipment overseas; (iv) closed business strategies of companies have failed to achieve the benefits of international specialization.
- At the same time, there are not any Japanese ICT companies that have established a presence in the global market like American digital platformers (platform companies).

Fig. 4 Changes in production, import and export, etc. of ICT-related equipment*



(Source) "Machinery Statistics" (Ministry of Economy, Trade and Industry), "Trade Statistics of Japan" (Ministry of Finance)

Fig. 5 Changes in the production, imports and exports of communications equipment



(Source) "Machinery Statistics" (Ministry of Economy, Trade and Industry), "Trade Statistics of Japan" (Ministry of Finance)

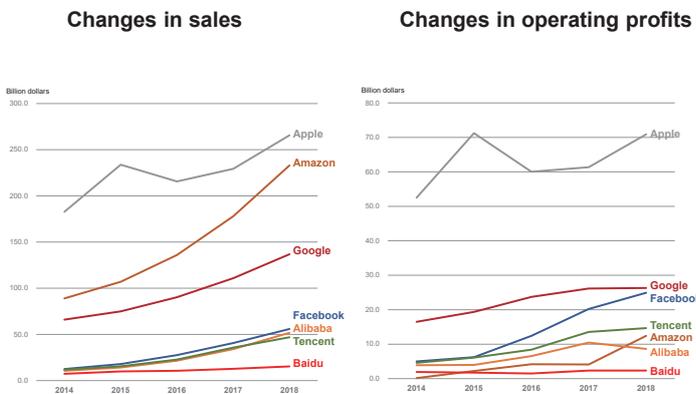
Chapter 1

How ICT and the Digital Economy Have Evolved (2/2)

(3) New Trends in ICT

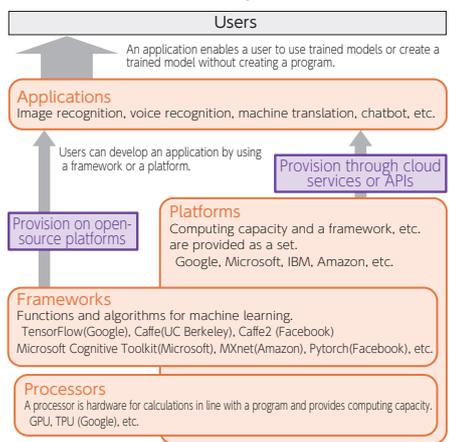
- Digital platformers, such as GAF A (Google, Apple, Facebook, and Amazon) in the US and BAT (Baidu, Alibaba, and Tencent) in China, enable individuals and companies to engage in activities free from constraints in terms of time, location or business size, and provide platforms to have the digital economy function on a global scale. Additionally, digital platformers have achieved growth through the snowball effect of increased collection and use of data over the Internet, and through the network effect (Fig. 1 below).
- Digital platformers have been providing various tools serving as foundations for developing and utilizing AI on open-source platforms or through cloud services, etc. and the development and utilization of AI are becoming easier. At the same time, an ecosystem heavily dependent on these digital platformers is being formed with regard to AI (Fig. 2 below).
- Digital platformers have also been expanding their businesses in the real world and their moves in the real world should be noted.
- Furthermore, cyber incidents may exert influence on the real world due to the spread of IoT, and cybersecurity will continue to be important in this regard.

Fig. 1 Changes in sales and operating profits of US and Chinese digital platformers



(Source) Accounting data from respective each company

Fig. 2 Provision of tools by digital platformers that serve as a foundation for developing and utilizing AI



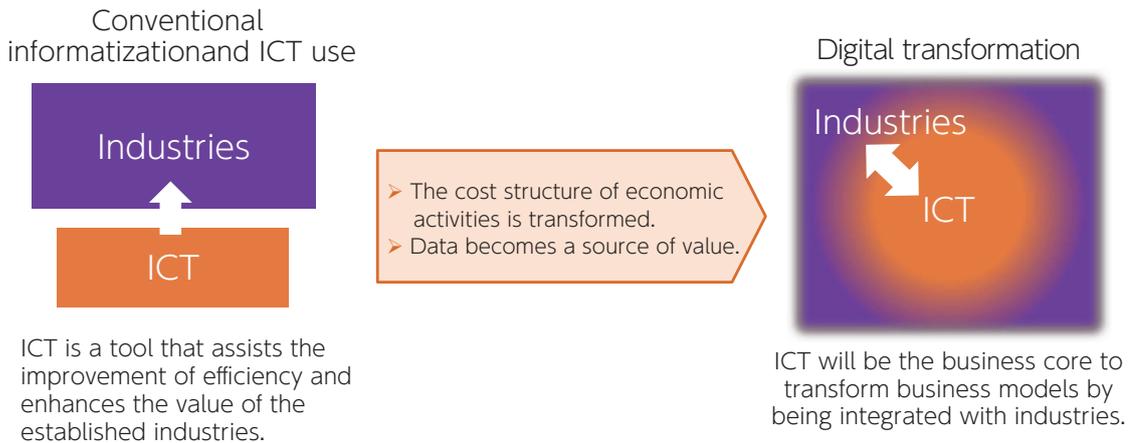
Chapter 2

Requirements for Achieving the Full Benefits of "Society 5.0" (1/2)

(1) Characteristics of the Digital Economy and Digital Transformation

- In the digital economy, data are sources that create value, and ICT transforms the cost structure, which is the basis for economic activities.
- Markets are expanding to enable activities which are free from time and location constraints, and at the same time, markets are being divided more finely with the emergence of niche markets that overcome business size constraints.
- New cost structures being developed by ICT requires a transformation of companies.
- Traditional players in all industries now need to position ICT as their business core, and transform their business models through integration with ICT (digital transformation) so that they can properly respond to these changes.

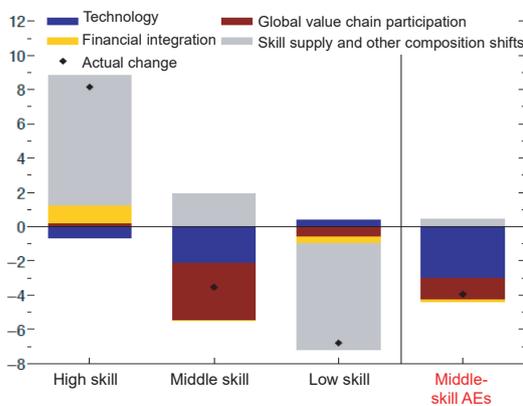
Fig. Digital transformation for responding to changes



(2) The Society to be Created through Evolution of the Digital Economy

- Since the financial crisis of 2007-2008, developed countries have all been facing sluggish GDP growth, and some came to express techno-pessimism, which are doubts about the effects of ICT on economic growth.
- In addition, as free services and the sharing economy expanded, the effectiveness of GDP as an economic indicator and techniques to better capture economic activities have come under discussion.
- There is also a view that ICT particularly affects the employment and labor share of middle-skilled workers in advanced economies (Fig. 1 below), and leads to the creation of domestic social inequality.
- However, in the case of significant technologies developed in the past (such as electricity), complementary reforms were required for generating effects, and there were time lags.
- This also applies to ICT, and complementary reforms will be essential to realize "Society 5.0", the society ahead the evolution of the digital economy. Moreover, such reforms will enable ICT to contribute toward overcoming social issues further than economic development, such as contribution toward SDGs in fields of medicine, education, agriculture, etc. (Fig. 2 below).

Fig. 1 Changes in labor share worldwide (1991-2014)



(Source) "Why Is Labor Receiving a Smaller Share of Global Income?" (Dao, M.C., et al.; 2017)

Fig. 2 Contribution to SDGs through digitalization (examples)

Field	ICT solutions (examples)	SDGs
Infrastructure	• Development of ICT infrastructure • Promotion of development of disaster-resilient social infrastructure	9, 11
Local infrastructure	• Provision of public services based on authentication infrastructure by utilizing biological information	11
Daily living	• Employment matching via use of ICT	8, 9
Medical services	• Provision of opportunities for telemedicine	3, 9
Nursing care	• Monitoring and diagnosis, preventive care and predictive detection by utilizing sensors, etc.	3, 9
Education	• Securing of educational opportunities through remote education systems • Provision of higher-definition videos and interactive high-quality educational content	4, 9
Agriculture	• Efficient farming by utilizing smart agricultural systems	2, 9
Food	• Demand-supply management via the use of ICT	2, 9
Urban cities	• Provision of mobility opportunities through the sophistication of self-driving systems and air traffic systems	9, 11
Rural areas	• Daily living support such as shopping assistance through ICT	9, 11
Disaster prevention	• Information collection and delivery of disaster information by utilizing satellites, drones, and sensors	11
Environment	• Monitoring and prediction of disasters by utilizing AI and IoT, etc.	11, 13
Tourism	• Access to diverse types of information and multilingual translation systems by utilizing AI	9, 11
Human exchange		
Financial services	• Mission-critical task systems for financial services • Micropayment and cashless infrastructure using blockchain technology	8, 9
Accessibility	• Provision of telework employment opportunities	8, 9
Gender	• Labor substitution and assistance for the disabled by utilizing robots and AI	8, 9

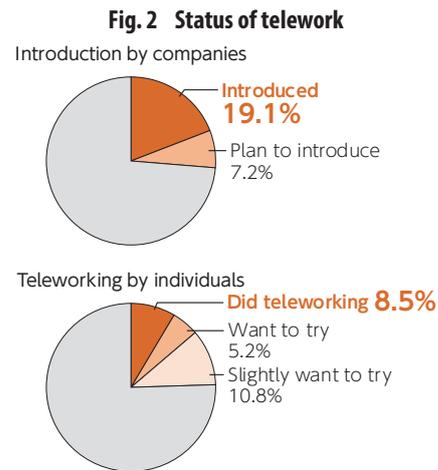
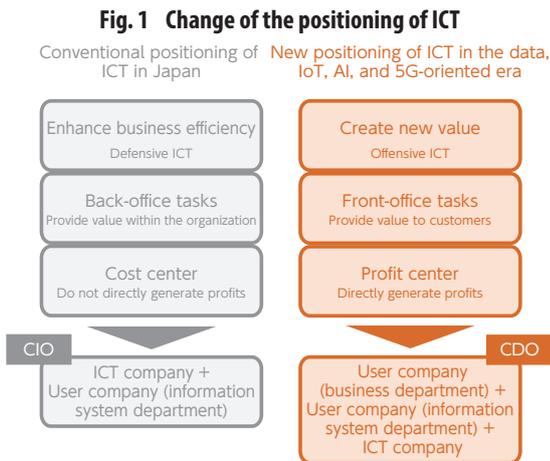
(Source) Materials for the "Commission on ICT Global Strategy in the Era of Digital Transformation" (Ministry of Internal Affairs and Communications; 2019)

Chapter 2

Requirements for Achieving the Full Benefits of “Society 5.0” (2/2)

(3) Required Reforms in Japan

- In order to proceed with digital transformation, companies must place importance on ICT, which they have traditionally outsourced as matters outside of their core businesses, and position it at the very center of their businesses. Companies’ business departments, in addition to information system departments, are required to play more significant roles (Fig. 1 below). ICT-related human resources need to be developed and secured, not only by ICT companies, but also by user companies.
- Upon changing business models, companies should get rid of their conventional closed business strategies and work on open innovation in cooperation with start-up ventures, etc.
- It is necessary to promote work-style reforms, such as the introduction of telework, which is better suited to a digital economy that is free from time and location constraints (Fig. 2 below).



(Source) “2018 Communications Usage Trend Survey” (Ministry of Internal Affairs and Communications; 2019)

(4) Opportunities for Local Regions/New Relationships between Humans and ICT

- In the digital economy, the use of ICT has the potential to diversify business partners, expand trade areas, enable people to receive orders from distant locations, and make up for labor shortages using machines, etc. This will provide opportunities for local regions.
- In order to take advantage of these opportunities, developing ICT infrastructure and making efforts to better utilize data are important. In particular, if 5G technology, which will be the infrastructure of IoT, is utilized in all fields, such as those relating to people’s daily lives, industries, medical services, and disaster response measures, it is expected to contribute to the solution of various problems faced by respective local regions (Fig. 1 below).
- In recent years, unique and niche appeals, strengths, and brands of local regions are being rediscovered by foreign countries and have created new markets by attracting people. Local regions may be able to fulfil their potential by exploring new business partners while further brushing up their strengths.
- New ICT, such as AI, should be accepted as a tool that increases what humans can do by expanding various human abilities (enhancing functions of limbs, visual and hearing senses, comprehension and learning abilities, etc.), not as a substitute for humans that deprives them of employment opportunities.

Fig. 1 Problem solution in local regions using 5G technology

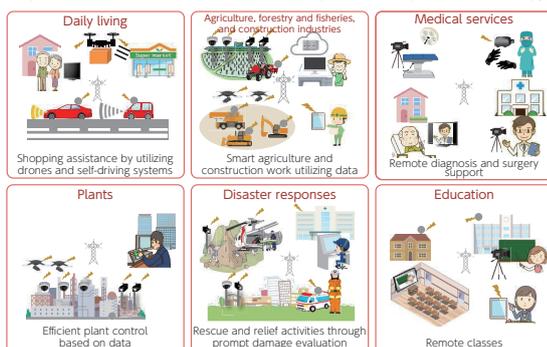
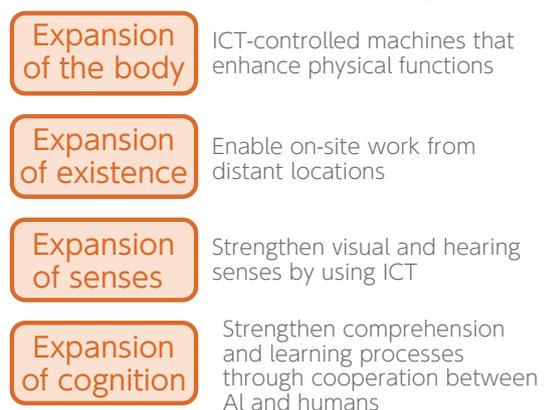


Fig. 2 Expansion of human abilities by ICT



Part 2 Basic Data and Policy Directions

Chapter 3 Basic Data on the ICT Field

ICT industry trends

- The ICT industry's nominal domestic production value in 2017 was 97.5 trillion yen, accounting for 9.7 percent of all industries and making it the largest industry in the country.
- With regard to the real GDP of Japan's major industries in 2017, the real GDP of the ICT industry accounted for 9.5% of that for all industries, following the commerce and real estate industries.

Figure: Domestic production values of major industries (based on nominal domestic production) (2017)

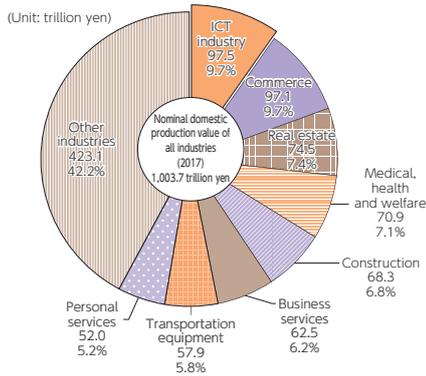
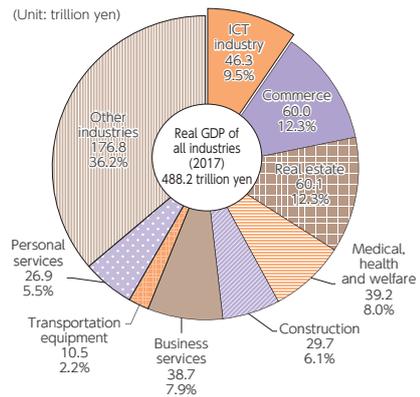


Figure: Real GDP of major industries (2017)



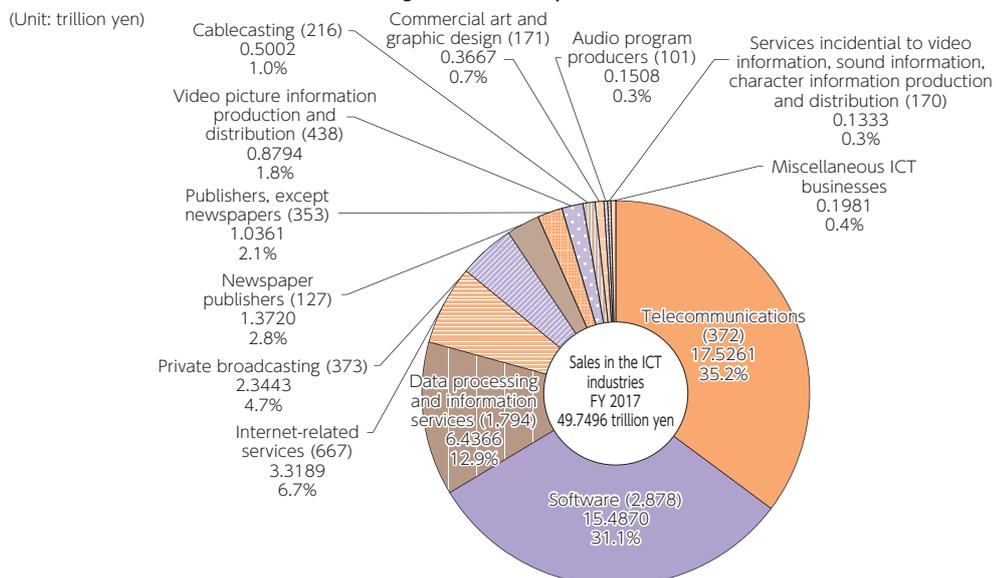
Research and development of the ICT industry

- The ICT industry spent 3.7117 trillion yen on research in FY2017, accounting for 26.9% of all corporate research spending. The ICT industry employed 171,235 researchers, or 34.3% of all corporate researchers in Japan.

State of ICT business operations

- The number of companies engaged in ICT business stood at 5,467, and their sales amount for FY2017 was 49.7496 trillion yen.

Figure: ICT industry sales



(Notes) *1 Figures in parentheses are the number of companies.

*2 "Miscellaneous ICT businesses" refers to enterprises that selected "other" as the primary business in the breakdown of sales attributable to ICT business operations.

Internet usage trends

- The internet usage rate in 2018 was 79.8%. As for the state of ownership of ICT devices among households, the ownership rate for smartphones reached 79.2%, exceeding that for computers (74.0%).

Figure: Changes in the internet penetration rate among the population

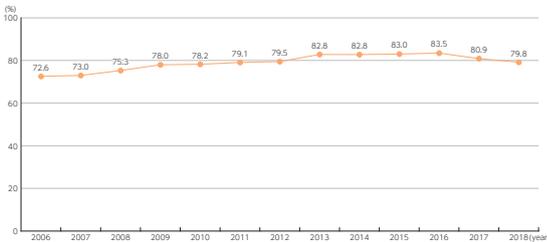
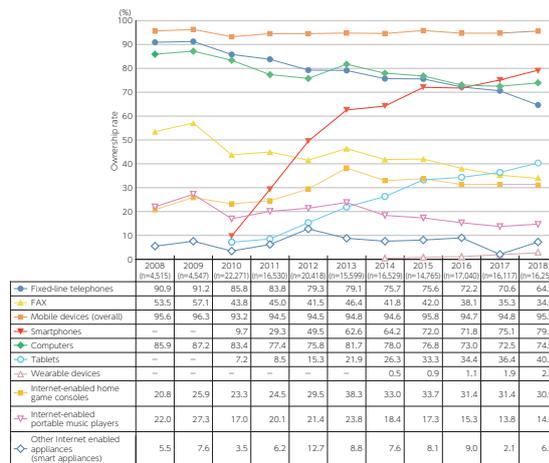


Figure: Changes in ownership rates for ICT devices (households)



Introduction and usage of IoT/AI systems and services by enterprises

- 12.1% of enterprises introduced IoT/AI systems, and it reaches 20% by including enterprises which are planning to introduce.

Figure: Current state of the introduction of IoT/AI systems and services

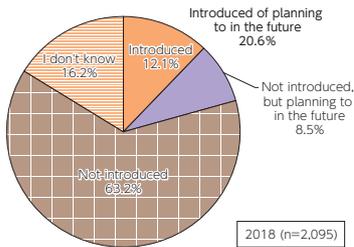
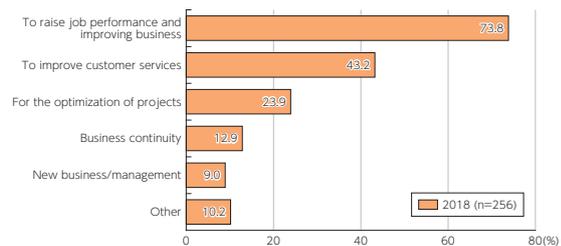


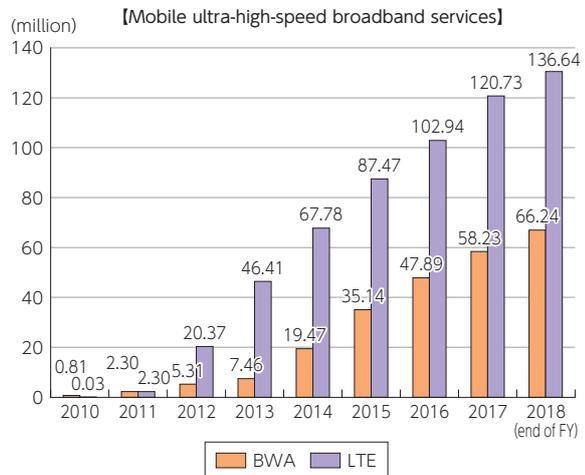
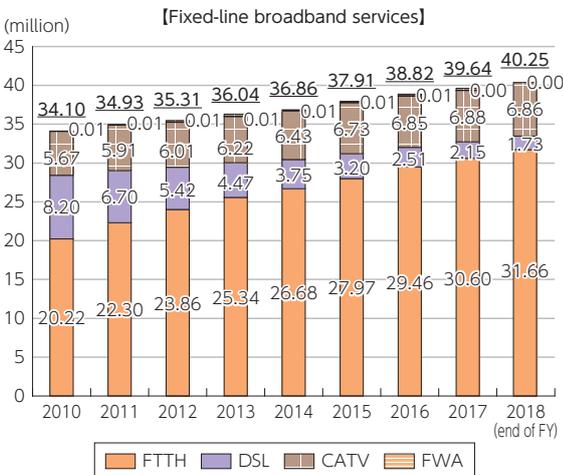
Figure: Purpose behind collecting and analyzing digital data



Telecommunication services

- The number of subscriptions to fixed-line broadband services at the end of FY2018 stood at 40.25 million. Subscriptions to mobile ultra-high-speed broadband services broke down into 136.64 million for 3.9G and 4G (LTE) services and 66.24 million for BWA services.

Figure: Changes in broadband service subscriptions



Broadcasting services and content market

- The sales amount of Japanese broadcasters in FY2017 was 3.9337 trillion yen.
- Japan's content market was valued at 11.8099 trillion yen, nearly 60% of which was attributable to video content, about 36% to text-based content, and 6% to audio-based content.
- The export value of Japanese broadcast content was 44.45 billion yen in FY2017.

Figure: Changes in and breakdown of the market size (aggregate sales) of Japan's broadcasting industry

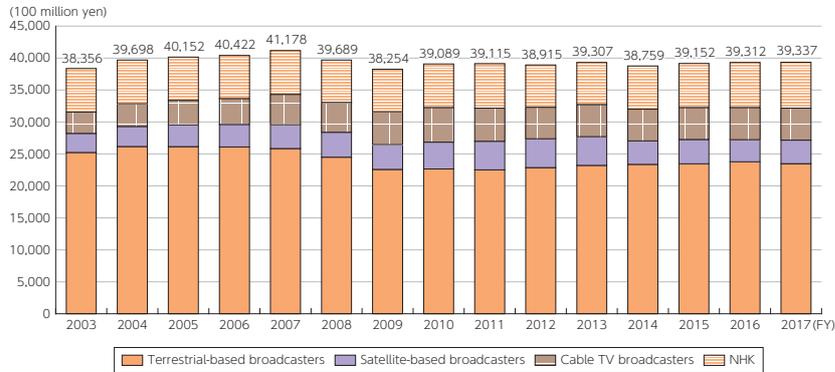
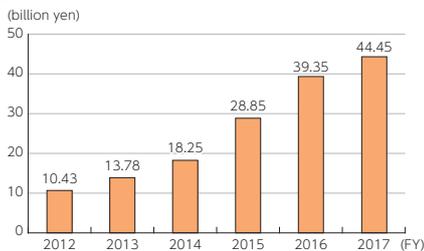
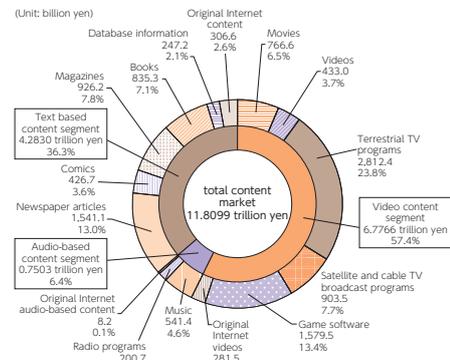


Figure: Export value of Japanese broadcast content



- (Notes) *1 Export value of broadcast content: program broadcast rights, Internet distribution rights, video and DVD rights, format and restaging rights, merchandising rights, and similar rights.
 *2 Calculated based on questionnaire responses by NHK, main commercial broadcast stations, producers, sub-main commercial broadcast stations in Osaka, local stations and satellite broadcasting stations.
 *3 Calculations for FY 2016 and later include digital gaming rights.

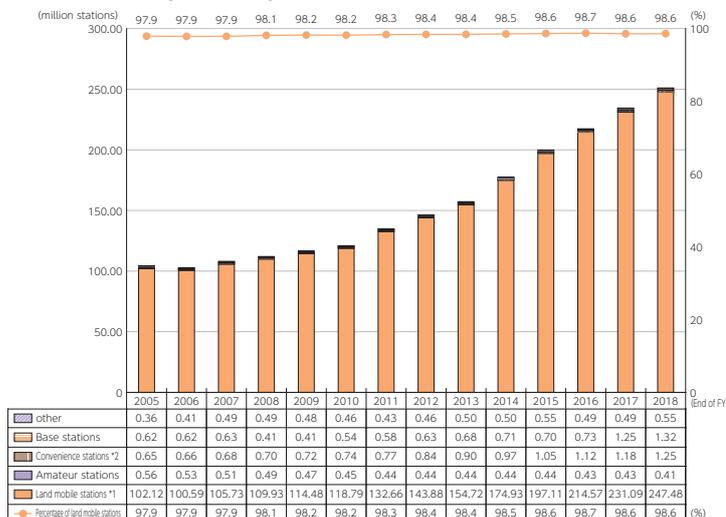
Figure: Breakdown of Japan's content market (2017)



Radio spectrum usage

- The number of radio stations in Japan has been on an increasing trend, and the number of radio stations at the end of FY2018 was 251.01 million (a 7.1% increase over the previous year), including 247.48 million mobile phones and other land mobile stations (a 7.1% increase over the previous year) which accounted for a high 98.6% of all radio stations.

Figure: Changes in the number of radio stations



- (Notes) *1 "Land mobile station" refers to a radio station that is operated either while in motion on land or while stationary in an unspecified location (such as mobile phones).
 *2 "Convenience station" refers to a radio station used for simple radio communications.

Chapter 4

ICT Policy Directions

Promotion of Comprehensive Strategies

- In June 2019, the government enacted the Growth Strategy Action Plan, by Cabinet decision. MIC has held the Roundtable Meeting on ICT Global Strategy for the Digital Transformation Age since December 2018 and announced the ICT Global Strategy in May 2019.

Developments in Telecommunication Policy

- MIC conducted a comprehensive review of competition rules and related topics in the telecommunications field, which included approaches to maintaining communication infrastructure, approaches to network neutrality, approaches to addressing issues with IT platform services, and approaches to ensuring competitive environments and consumer protection rules in the mobile market. MIC also took measures for ensuring the safety and reliability of telecommunications infrastructure and enhancing online safety and security.

Developments in Radio Policy

- MIC took measures for 5G implementation; promotion of effective radio spectrum use; realization of Public Safety LTE (PS-LTE) networks; approaches to the build-out of base stations; and establishment of radio usage environments.

Developments in Broadcasting Policy

- MIC promoted exports of broadcasting content; promoted 4K and 8K broadcasting; promoted development of broadcast services; and took measures to strengthen the disaster resilience of broadcast networks.

Promoting Cybersecurity Policy

- MIC conducted examinations of action plans for cybersecurity and developed cybersecurity policy.

Promoting ICT Use and Application

- MIC took measures for the realization of a symbiotic society; promoted telework; promoted ICT application in education, medicine, and other fields; developed policies for local development using ICT infrastructure; and took measures to create environments where everyone can enjoy convenience through ICT.

Promoting ICT Research and Development

- MIC developed R&D strategies; enhanced R&D to realize cutting-edge ICT in all aspects of society; took measures for the deployment of the results of research into multilingual voice-based translation technologies; and conducted R&D into next-generation AI technologies.

Promoting International Strategies for ICT

- MIC worked to spread the Japanese standard for terrestrial digital TV (ISDB-T) worldwide; deploy ICT systems (such as disaster-prevention systems) in Asia and Central and South American countries; and promote various forms of contributions and cooperation at multilateral and bilateral venues. Furthermore, MIC co-hosted the G20 Ibaraki-Tsukuba Ministerial Meeting on Trade and Digital Economy with MOFA and METI in June 2019.

Promoting Public Administration and Disaster Prevention through ICT

- MIC promotes e-government and informatization in the field of government disaster-resilience.

Developments in Postal Service Administration

- MIC focuses on assisting the deployment of postal systems mainly in developing countries using Japan's outstanding knowledge of postal operations.