

Outline of the 2019 White Paper on Information and Communications in Japan

(Unofficial Translation)

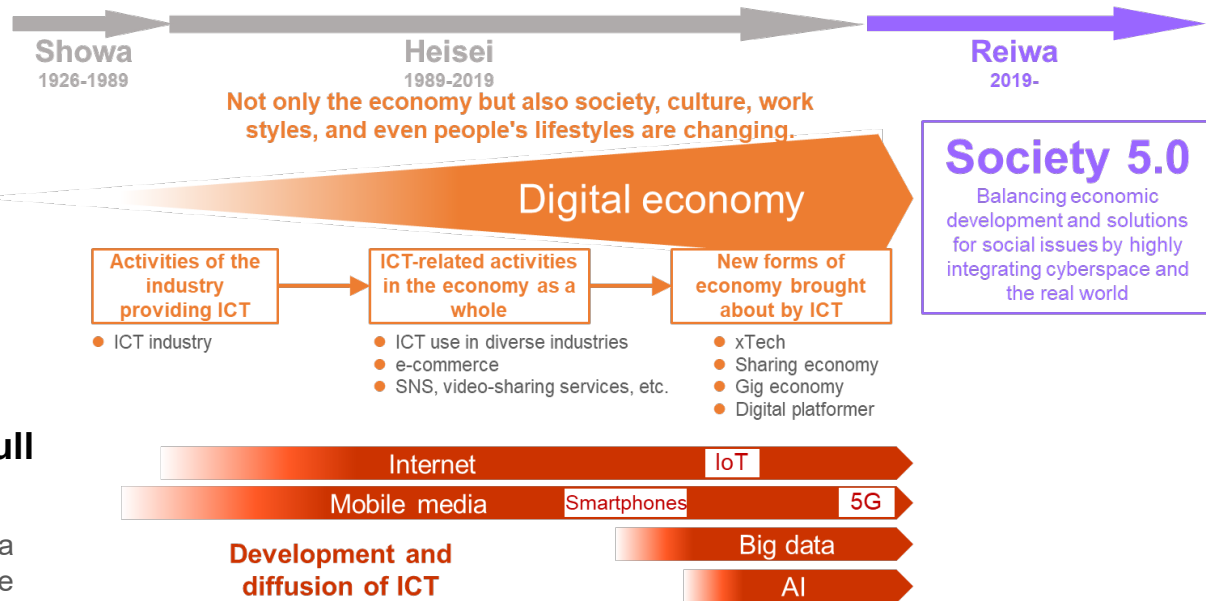
July 2019

Economic Research Office,
Information and Communications Bureau,
Ministry of Internal Affairs and Communications, Japan

Part I: Special Theme: Evolving Digital Economy towards "Society 5.0"

Chapter 1: How ICT and the Digital Economy Have Evolved

- Looking back on the evolution of and changes in ICT services and technologies, as well as in industry and the global economy as a whole during mainly the Heisei era, while pointing out present challenges.
- Describes the market size for major products and services in the ICT field, changes in ICT investment, and new trends in ICT (digital platformers, AI, cybersecurity etc.).
- Reviews changes in the media environment brought about by the diffusion of the Internet and discussions over polarized public opinion and Internet flaming.



Chapter 2: Requirements for Achieving the Full Benefits of "Society 5.0"

- Describes the characteristics of the digital economy and a forecast for "Society 5.0" to be achieved as a result of the evolution of the digital economy.
- Organize discussions over the digital economy, GDP, and social inequality.
- Present reforms necessary in Japan for achieving full merits of "Society 5.0."
- Forecast possible opportunities for local regions amid evolution of the digital economy.
- Analyze new work styles using ICT and new relationships between humans and ICT.

Part II: Basic Data and Policy Trend

Chapter 3: Basic Data on the ICT Field

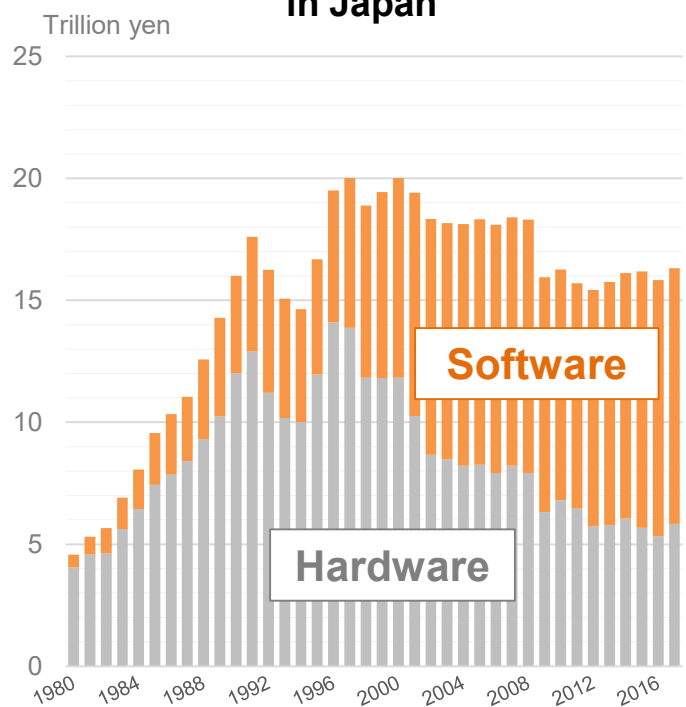
Chapter 4: ICT Policy Trend

Chapter 1: How ICT and the Digital Economy Have Evolved – 1

Evolving ICT Services and Changes in Companies' Use of ICT

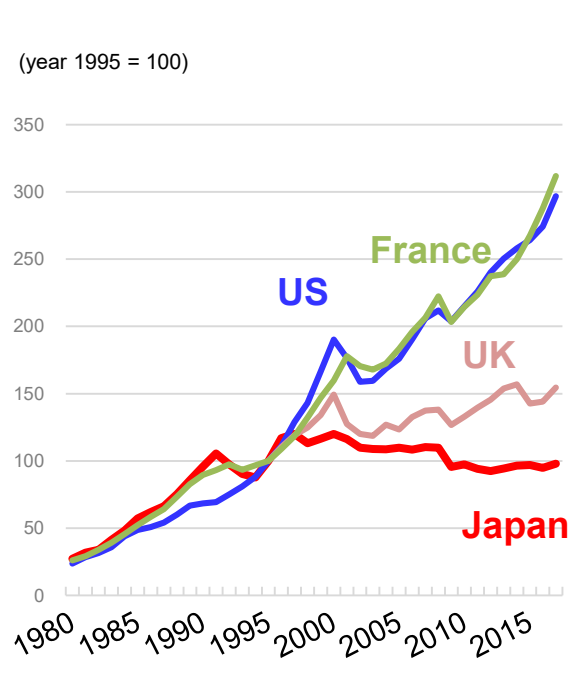
- Mobile phones and the Internet widely spread during the Heisei era. The spread was facilitated by regulatory reforms such as allowing mobile operators to sell mobile devices instead to rent them (1994).
- In the Showa era, some Japanese companies became pioneers of the development of online systems 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



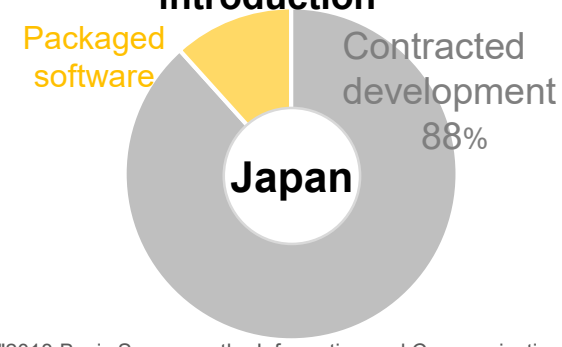
Source: Created based on the "National Accounts of Japan" (Cabinet Office)

Fig. 2 Comparison of changes in ICT investment values

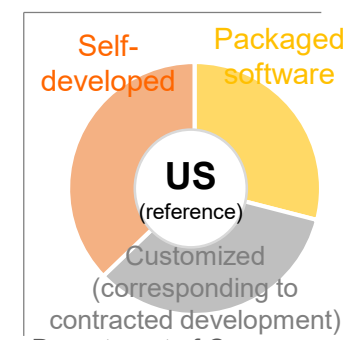


Source: Created based on the OECD Stats

Fig. 3 Breakdown of software introduction



Source: "2018 Basic Survey on the Information and Communications Industry" (MIC, METI; 2019)



Source: United States Department of Commerce

Chapter 1: How ICT and the Digital Economy Have Evolved – 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. 1 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. 2 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. 1 Changes in production, import and export, etc. of ICT-related equipment*

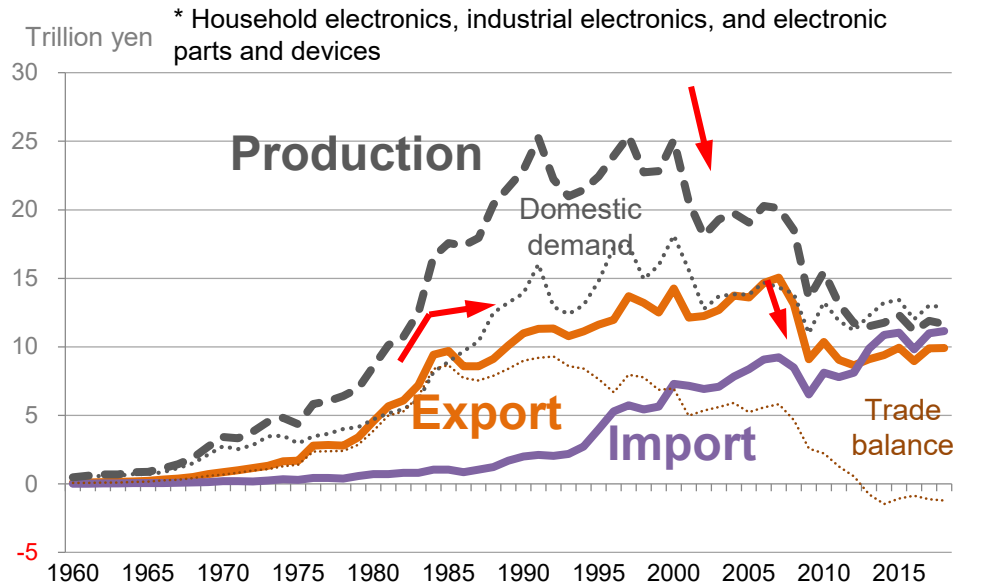
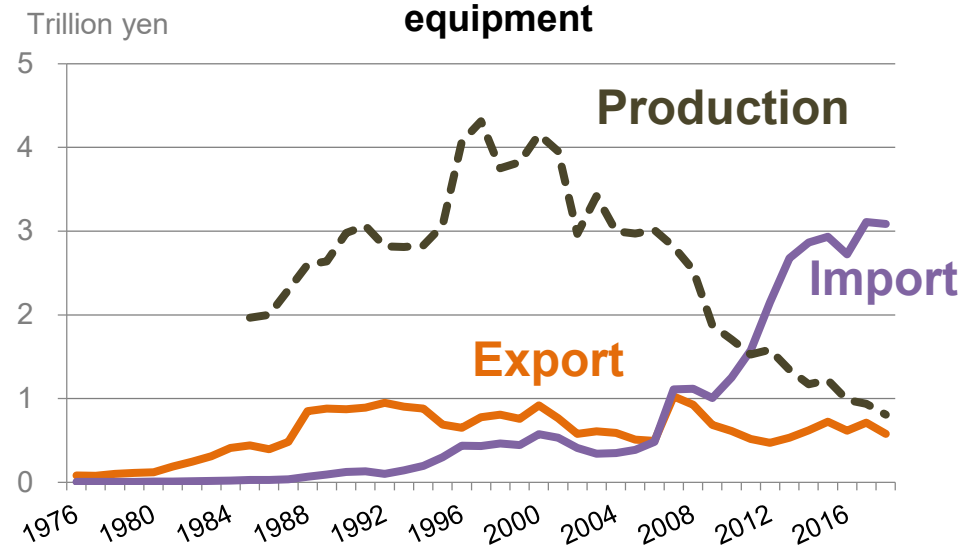
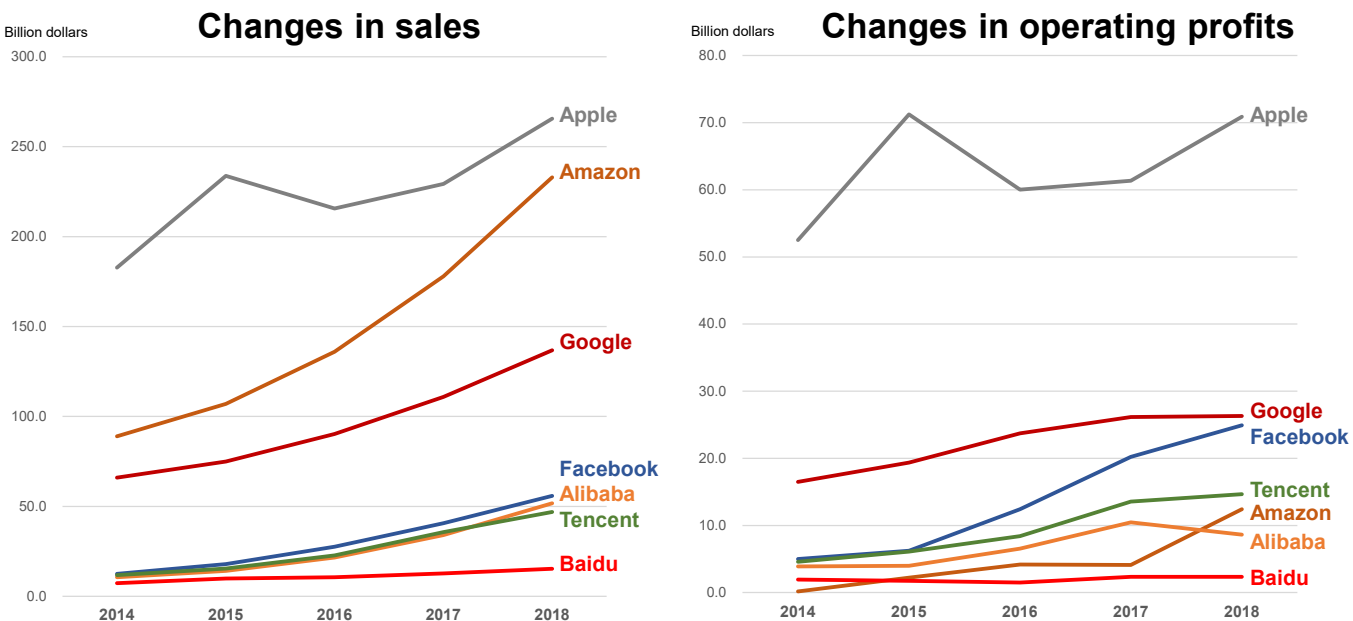


Fig. 2 Changes in the production, imports and exports of communications equipment



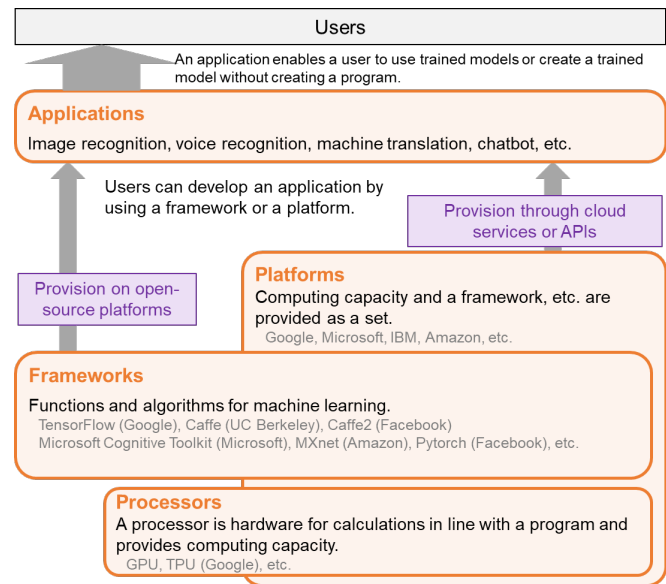
- Digital platformers, such as GAFA (Google, Apple, Facebook, and Amazon) in the US and BAT (Baidu, Alibaba, and Tencent) in China, enable individuals and companies to engage in activities free from constraints in terms of time, location or business size, and provide platforms to have the digital economy 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

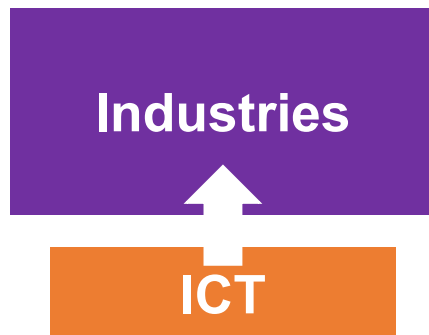
Fig. 2 Provision of tools by digital platformers that serve as a foundation for developing and utilizing AI



- 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.

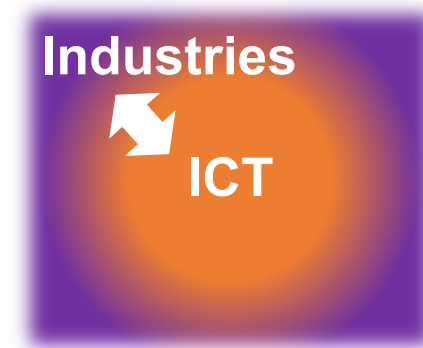
Fig. Digital transformation for responding to changes

Conventional informatization and ICT use



ICT is a tool that assists the improvement of efficiency and enhances the value of the established industries.

Digital transformation

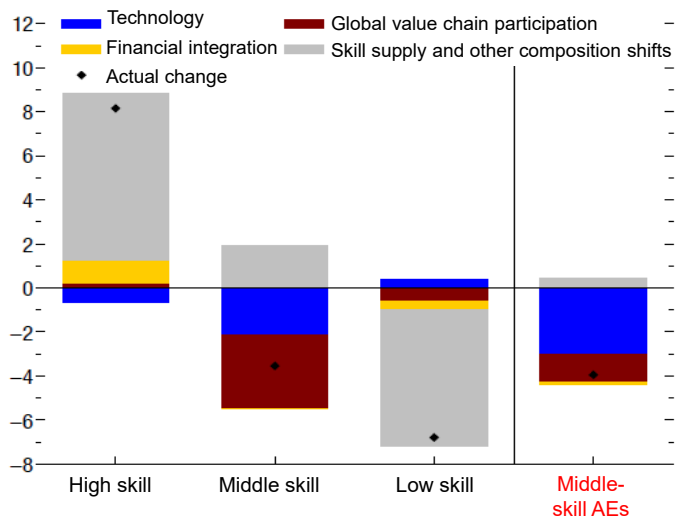


ICT will be the business core to transform business models by being integrated with industries.

- The cost structure of economic activities is transformed.
- Data becomes a source of value.

- 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	<ul style="list-style-type: none"> Development of ICT infrastructure Promotion of development of disaster-resilient social infrastructure 	
Local infrastructure	<ul style="list-style-type: none"> Provision of public services based the authentication infrastructure by utilizing biological information 	
Daily living	<ul style="list-style-type: none"> Employment matching via use of ICT 	
Medical services	<ul style="list-style-type: none"> Provision of opportunities for telemedicine 	
Nursing care	<ul style="list-style-type: none"> Monitoring and diagnosis, preventive care and predictive detection by utilizing sensors, etc. 	
Education	<ul style="list-style-type: none"> Securing of educational opportunities through remote education systems Provision of higher-definition videos and interactive high-quality educational content 	
Agriculture	<ul style="list-style-type: none"> Efficient farming by utilizing smart agricultural systems 	
Food	<ul style="list-style-type: none"> Demand-supply management via the use of ICT 	
Urban cities	<ul style="list-style-type: none"> Provision of mobility opportunities through the sophistication of self-driving systems and air traffic systems 	
Rural areas	<ul style="list-style-type: none"> Daily living support such as shopping assistance through of ICT 	
Disaster prevention	<ul style="list-style-type: none"> Information collection and delivery of disaster information by utilizing satellites, drones, and sensors 	
Environment	<ul style="list-style-type: none"> Monitoring and prediction of disasters by utilizing AI and IoT, etc. 	
Tourism	<ul style="list-style-type: none"> Access to diverse types of information and multilingual translation systems by utilizing AI 	
Human exchange		
Financial services	<ul style="list-style-type: none"> Mission-critical task systems for financial services Micropayment and cashless infrastructure using blockchain technology 	
Accessibility	<ul style="list-style-type: none"> Provision of telework employment opportunities 	
Gender	<ul style="list-style-type: none"> Labor substitution and assistance for the disabled by utilizing robots and AI 	

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

- 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).

Fig. 1 Change of the positioning of ICT

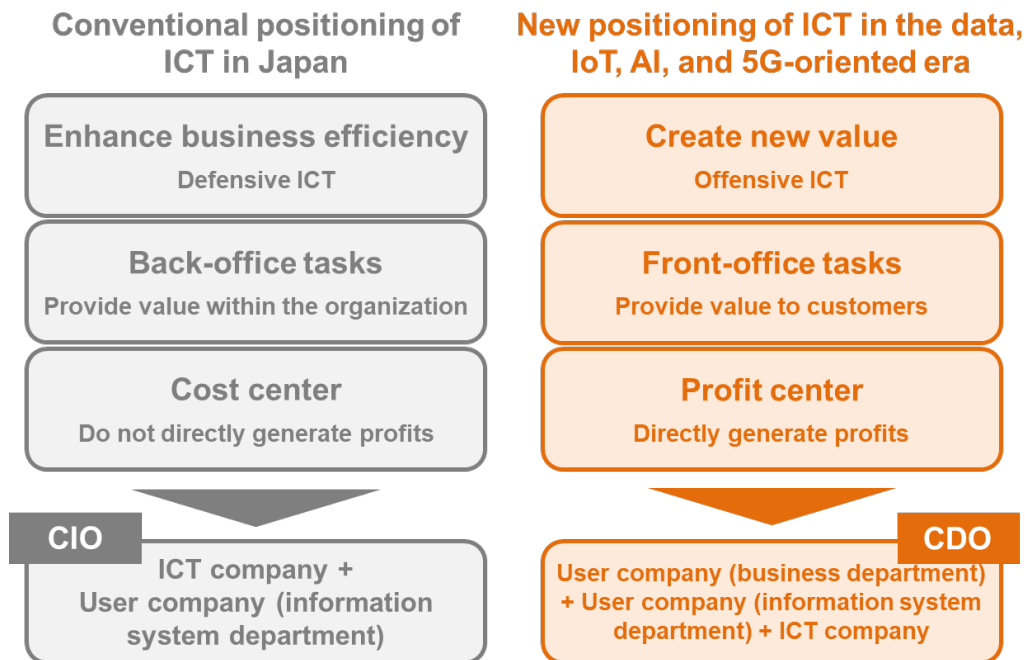
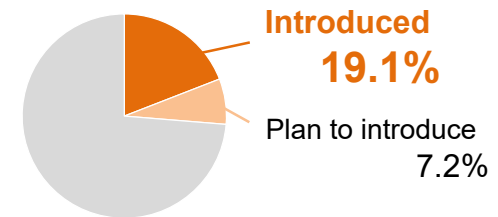
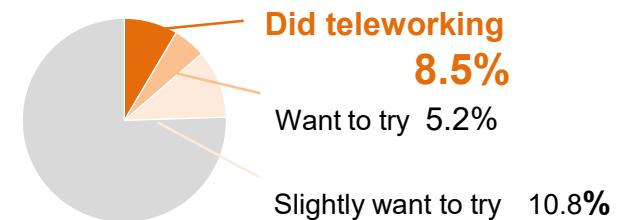


Fig. 2 Status of telework

Introduction by companies



Teleworking by individuals



Source: "2018 Communications Usage Trend Survey" (Ministry of Internal Affairs and Communications; 2019)

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

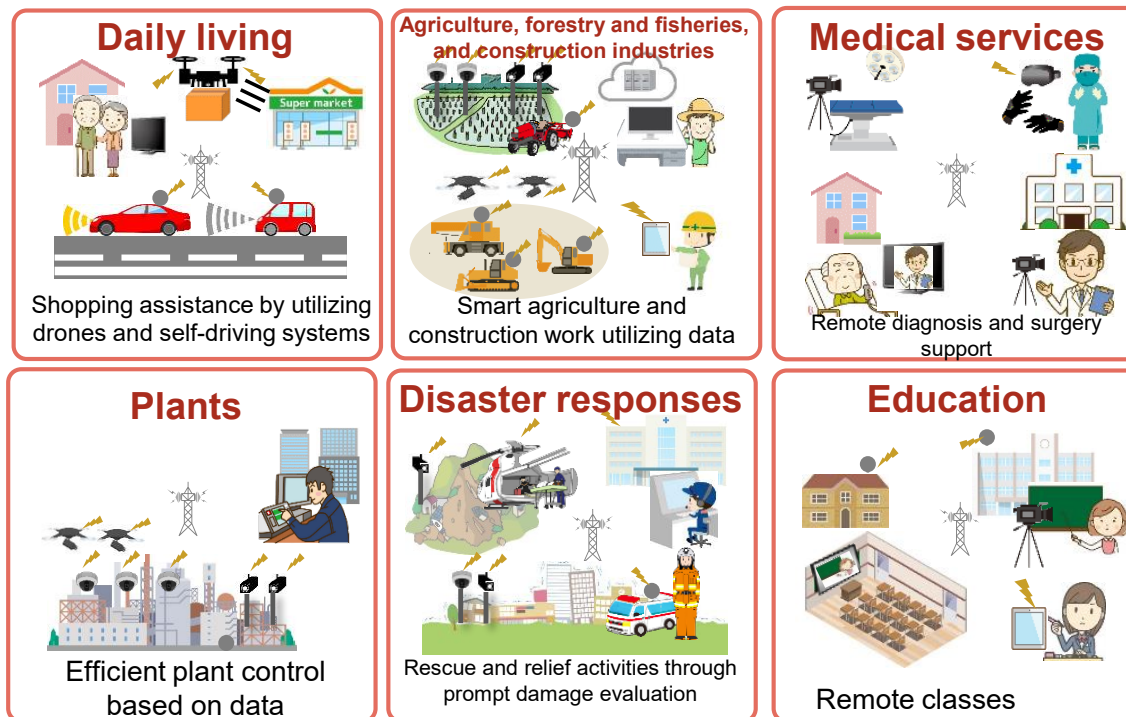


Fig. 2 Expansion of human abilities by ICT

- Expansion of the body** ICT-controlled machines that enhance physical functions
- Expansion of existence** Enable on-site work from distant locations
- Expansion of senses** Strengthen visual and hearing senses by using ICT
- Expansion of cognition** Strengthen comprehension and learning processes through cooperation between AI and humans