

# Introduction

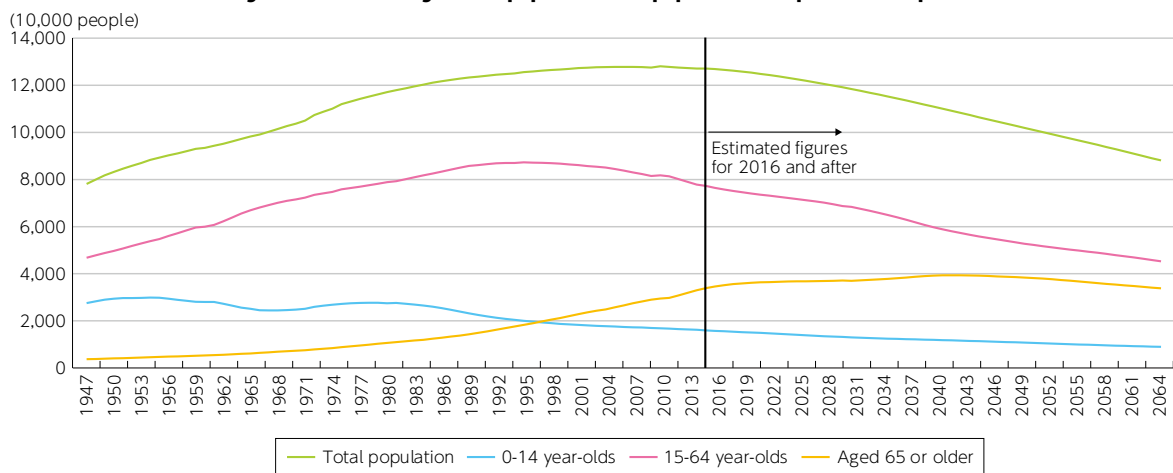
## 1. Era of Population Decline and its Challenges

### (1) Current State of Population Decline

As a result of rapid progress of the decline of the birthrate and population aging, Japan's total population started to decline in 2008. Now we are facing an era of population decline. The future population projection of the National Institute of Population and Social Security Research estimates that Japan's total population will reach a level below 100 million in 2050. Population com-

position has also changed. The elderly population over 65 years of age exceeded the population of youth under 14 in 1997, and increased to 35.15 million or 27.7% of the total population in 2017. The production-age population (aged between 15 and 64) that was 75.96 million (60.0% of the total population) in 2017 is estimated to decrease to 59.78 million (53.9%) by 2040 (Figure 0-1-1-1).

**Figure 0-1-1-1 Change of the population and population composition of Japan**



(Source) Up to 2017: "Census" and "Population Estimate (as of October 1 of each year)". MIC, (the total population includes "population of indeterminate age"; the ratios are based on proportional correction of the "population of indeterminate age." Values in and before 1971 do not include Okinawa Prefecture)

\*2018 and after: "Population Projection for Japan (April 2017)", National Institute of Population and Social Security Research (projection of medium -fertility and medium-mortality)

## 2. Toward a Data-driven Society

### (1) Value of data

ICT (Information and Communications Technology) has further evolved in recent years. With increased use of the Internet and the spread of IoT (Internet of Things), various people, things and organizations are connected to networks, which is advancing generation, collection and accumulation of large amounts of data (Big Data). By utilizing the result of analysis of these data by Artificial Intelligence (AI) for efficiency improvement of business processing, improvement of prediction accuracy, provision of optimal advice and efficient control of machines, for example, we can create new values in the real world.

Collection of more information from the real world through IoT will enable more detailed reproduction of the real-world situation in the cyber space, which may enable complicated root cause analysis and future prediction that are difficult in the real world alone, and thus lead to consideration of best measures and plans.

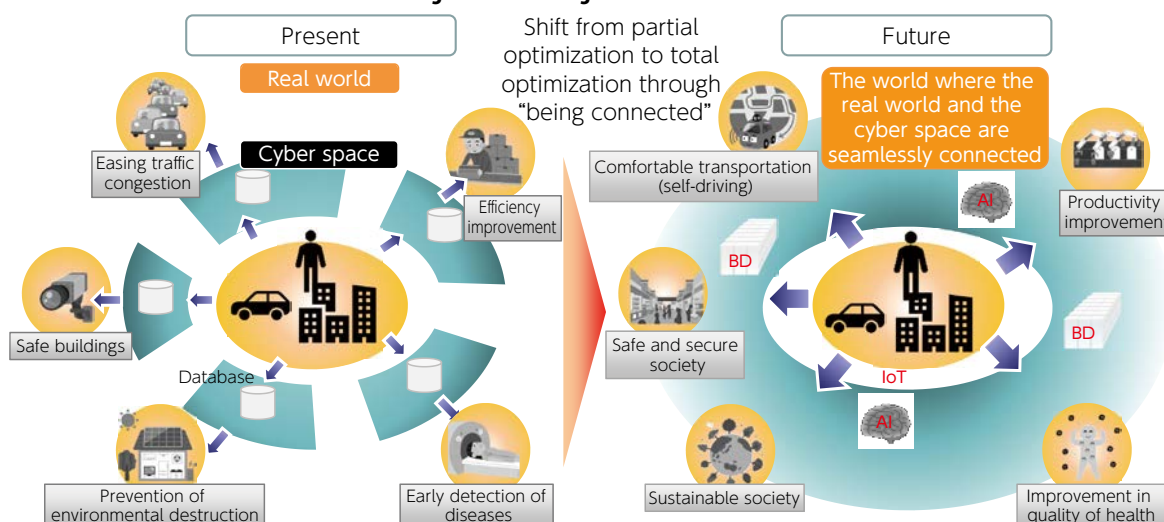
Not only the quantity of data but also their variety and quality are important. Availability of a large volume of wide-variety (multidiscipline, multiservice) and high-quality (high-accuracy, high-definition) data has a decisive influence on competitiveness and is a source of innovation.

### (2) Digital Transformation

We can say that we are now in the era of "Digital Transformation<sup>1</sup> where penetration of ICT changes people's lives in every aspect toward a better direction." This change will pervade society in stages with a big impact. First, AI, IoT and other ICT will be introduced to the existing social and economic systems including infrastructure, institutions, organizations and production methods. Next, the social and economic systems will be changed to utilize ICT. Further, we will see the birth of new social and economic systems that can maximize the potential of ICT (Figure 0-1-2-1).

<sup>1</sup> Concept advocated by Professor Erik Stolterman of Umeå University (Sweden) in 2004

Figure 0-1-2-1 Digital Transformation



(Source) Survey and research on the present state of ICT in Japan, MIC, 2018

### (3) Society 5.0

A vision of a society with advanced digitalization like the one shown above is Society 5.0. Society 5.0 was proposed as a future society that Japan should aspire to in the Fifth Science and Technology Basic Plan of the Cabinet Office. It follows the previous societies: hunting so-

ciety (Society 1.0), agricultural society (Society 2.0), industrial society (Society 3.0), and information society (Society 4.0), as "A human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates *cyberspace* and *physical space*."

## 3. Sustainable Growth through ICT in the Era of Population Decline

As mentioned earlier, declining birthrate / aging population accompanied with population decline could have a major impact on Japan's economy and society. In terms of the economy, the problem could exert a negative impact on both the demand and supply sides, possibly impeding medium- to long-term economic growth.

On the demand side, the declining birthrate and population aging and the accompanying population decline will give rise to reduction of domestic demands in many fields. On the supply side, decline in the production-age population accompanying the declining birthrate and population aging will lead to the decline of labor input that is one of the three factors of economic growth: (1) labor input, (2) capital input and (3) Total Factor Produc-

tivity (TFP). Furthermore, if enterprises think that domestic markets will shrink due to population decline, it will lower their expectation concerning economic growth, which could exert a negative impact on (2) capital input.

In the social aspect as well, there will be a variety of issues due to changes in the social structure accompanying the declining birthrate and population aging.

In order to address these problems by creating new values as solutions toward sustainable growth, we can advance digital transformation by connecting people, things, organizations and communities through ICT that is further developing in recent years.