

# Summary of the White Paper on Land, Infrastructure, Transport and Tourism in Japan, 2023

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Policy Bureau, Ministry of Land,  
Infrastructure, Transport and Tourism  
(MLIT)

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# Composition (Part 1: Changing lives and society amid digitalization)

- Digitalization has been progressing rapidly in recent years, changing the international community, corporate activities, and individual lifestyles. Meanwhile, there are major challenges, such as deteriorating regional transportation services and labor shortages associated with a population decline, increasing intensity and frequency of natural disasters as a result of climate change, decarbonization etc.
- Advances in technology have been revolutionizing our lives, society, and the economy. It is important to consider the characteristics of digitalization and incorporate it effectively in order to solve challenges facing the nation and realize good lives and society.
- In this context, the government is advancing initiatives toward digitalization, including the launch of the Digital Agency and the formulation of the comprehensive strategy for the Vision for a Digital Garden City Nation. In particular, “digitalization in the fields of MLIT” is essential for creating sustainable, vibrant, and good lives and society. Such efforts include disaster prevention to protect the people’s life and property of citizens, the development of transportation systems and communities closely tied to daily lives, the development of logistics and infrastructure that support lives and society, and the digitalization of administrative procedures. In order to accelerate these efforts, it is extremely important to consider the trends and future prospects regarding digitalization in the fields of MLIT.
- Against this backdrop, under the theme of “Changing lives and society amid digitalization”, the report provides an overview of the current trends in digitalization in the fields of MLIT, and discusses the prospects for good lives and society to be realized through digitalization in these fields.

## Chapter 1 Digitalization in the fields of MLIT

- In order to provide an overview of the current status of digitalization in the fields of MLIT, the report summarizes the challenges facing the nation and the expected role of digitalization in solving them. The report also summarizes the current status of digital implementation and expectation for the future, focusing on initiatives toward the Vision for a Digital Garden City Nation and efforts that are being made in the fields of MLIT.

## Chapter 2 Toward the realization of good lives and society

- The report summarizes the direction of measures for digitalization by MLIT to solve challenges through digitalization and realize good lives and society. It also envisions what new lives and society would look like.

\*The full text of the White Paper on Land, Infrastructure, Transport and Tourism is published on the MLIT website.

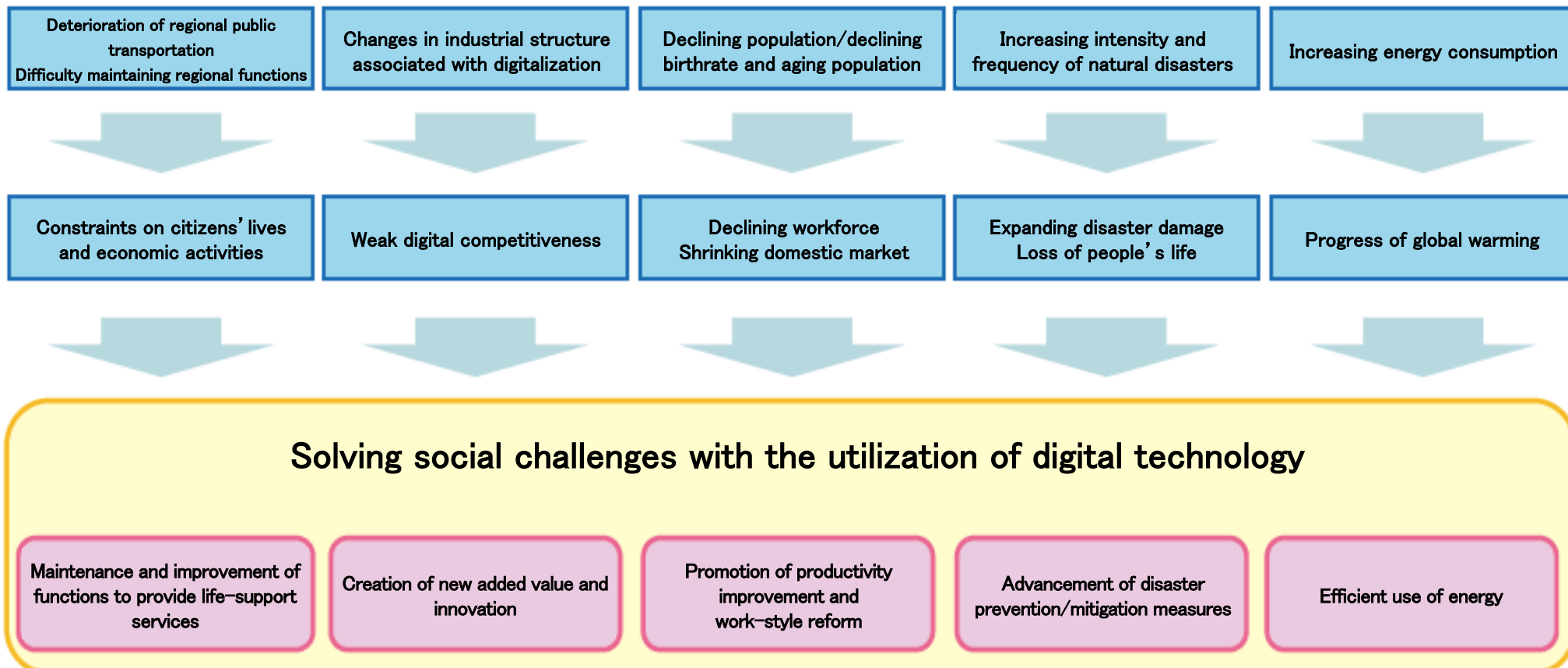


<https://www.mlit.go.jp/statistics/file000004.html>

## Section 1 Challenges facing the nation and the role of digitalization

- In order to solve economic and social challenges of the nation, it is important to further strengthen the existing efforts while at the same time incorporating rapidly advancing digital technology and implementing new policy measures. In doing so, it is necessary to clarify the challenges facing the nation and consider the characteristics of digitalization, instead of implementing digitalization in a haphazard manner.
- Chapter 1, Section 1 summarizes the social and economic challenges facing the nation, particularly in the fields of MLIT, and summarizes the role of digitalization from five perspectives.

### [Challenges confronting the nation and the role of digitalization]



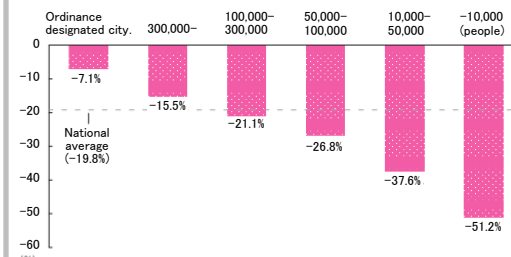
### 1. Maintenance and improvement of functions to provide life-support services (1)

- Declining population, a declining birthrate, and an aging population are progressing in Japan. Passenger-bus services, which provide local public transportation services, find themselves in a difficult situation as the number of passengers declines and income and expenditure deteriorate. This is especially the case in areas where the population is declining, i.e., those outside the three metropolitan areas. If this situation continues, there is a risk that functions to provide life-support services may decline and disappear.
- It is necessary to support lives by maintaining and improving functions to provide life-support services through digitalization.

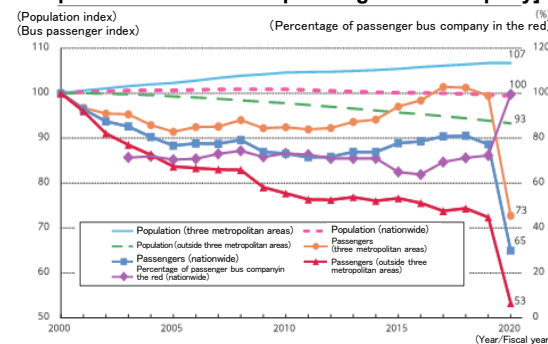
#### [(1) Social and economic challenges: 1]

##### (1) Accelerated decline in population and a risk that functions to provide life-support services may decline and disappear

[Estimated rates of population decline in cities, wards, towns, and villages in 2050 by population size]



##### (2) Concerns about a decline in local public transportation services and people who may become difficult to shop: 1 [Changes in the number of passengers and income and expenditure situation of passenger bus company]



Source: Created by MLIT based on Population Estimates released by the Ministry of Internal Affairs and Communications and on Annual Report of Automobile Transport released by MLIT

##### (3) Challenges in urban areas

- With the declining birthrate and aging population in Japan, there are concerns about disaster vulnerability in areas where the elderly population is increasing. Future projections for the elderly population by city size indicate that the growth rate for the elderly population may be higher in cities with a large population size.
- In urban areas, there are concentrations of densely populated districts that are extremely dangerous during earthquakes. These areas face challenges when it comes to disaster prevention and the living environment. With the aging of urban residents, there are concerns that disaster prevention in urban areas may decline in the future.

#### [(2) Role of digitalization]

##### (1) Transition to a next-generation transportation system

- AI on-demand transportation that uses digital technology will enable flexible travel through efficient dispatch of vehicles based on demand. This will include passenger transportation between the departure location and the destination outside the traditional public transportation route. Such a system is expected to improve convenience and lead to an increase in the number of passengers, and contribute to the maintenance of public transportation networks in an efficient manner.

##### (2) Creation of sustainable and vibrant regional communities even with a declining population (the formation of regional living areas)

- It is expected that the use of digital technology may lead to the formation of regional living areas where services necessary for living will be provided in a sustainable manner. It is also expected that the quality of life in physical spaces may be maintained or improved through such as the efficiency and automation of daily life-support services.

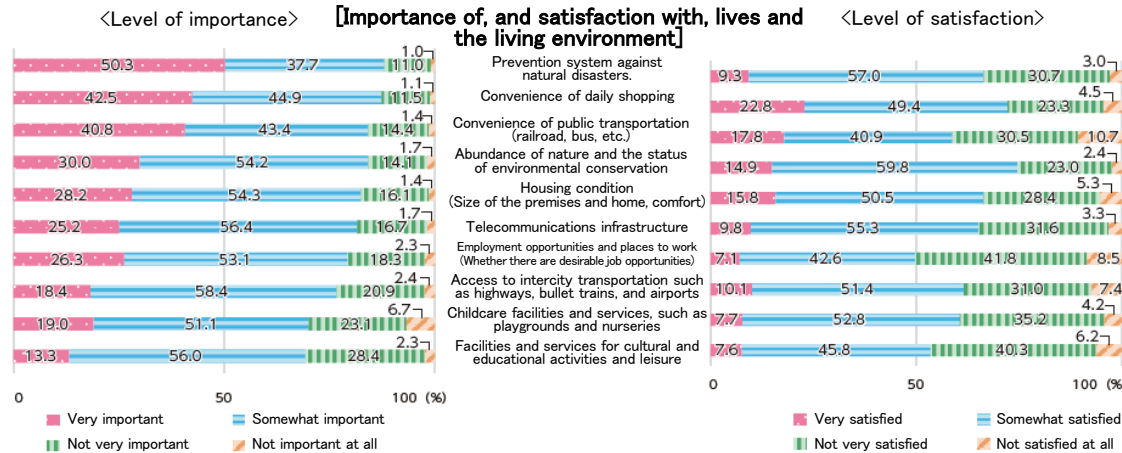
##### (3) Development of new communities through digitalization

- In urban areas, digital technology is expected to be used to reorganize spaces to reduce congestion and to advance area management for disaster prevention. In rural areas, digital technology is expected to provide support for diverse ways of living and working.

### 1. Maintenance and improvement of functions to provide life-support services (2)

#### [(1) Social and economic challenges] (2)

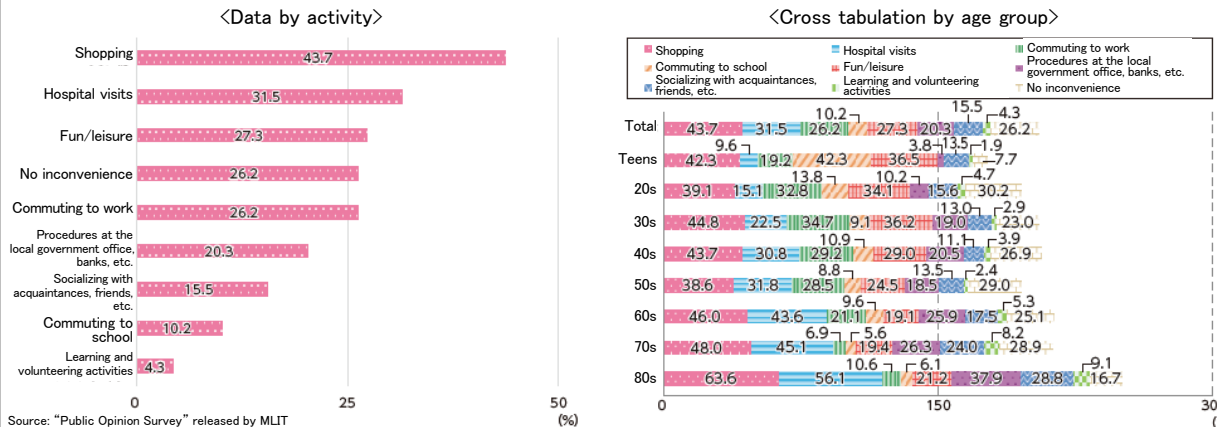
#### (2) Concerns about a decline in local public transportation services and people who may become difficult to shop (2)



Source: "Public Opinion Survey" released by MLIT

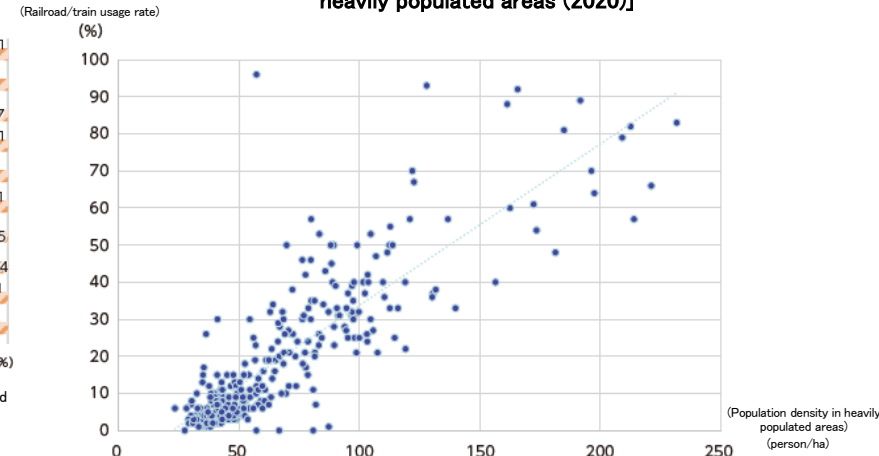
- With respect to items that people consider important or satisfactory in their lives and the living environment, more than 40% answered "very important" regarding "convenience of daily shopping" and "convenience of public transportation", in addition to "prevention system against natural disasters". When those who answered "somewhat important" are included, the figure exceeds 80%. This indicates that, in addition to disaster prevention system, convenient shopping and public transportation were also regarded as important.
- On the other hand, regarding satisfaction, about 10% answered that they were "not satisfied at all" when it came to the convenience of public transportation, the highest percentage among all items.

#### [Inconveniences caused by reduced means of transportation as a result of reduced or abolished public transportation routes]



Source: "Public Opinion Survey" released by MLIT

#### [Usage rates of railroads/trains in cities, wards, towns, and villages across the country (with a population of 100,000 or more) and the population density in heavily populated areas (2020)]



Source: Created by MLIT based on "2020 Population Census" released by the Ministry of Internal Affairs and Communications

- As for the relationship between population density and "usage rates of railroad/train", areas with high population density tend to have high "usage rates of railroad/train", while areas with low population density tend to have low "usage rates of railroad/train".
- The pace of population decline is expected to accelerate in the future. Thus, it is necessary to take a perspective that consider public transportation and community development together, such as a viewpoint on usage rates of railroad/train and population density.
- When asked which activities would be hampered as a result of reduced means of transportation, 43.7% answered "shopping" and 31.5% answered "hospital visits". By age group, this tendency is stronger among the elderly, indicating that public transportation is an indispensable means of transportation for the elderly for shopping and hospital visits.

### 2 . Creation of new added value and innovation to ensure competitiveness

- Japanese economy has been sluggish in recent years even as it maintains growth. For example, the growth rate of real GDP has been moderate compared with other major industrialized nations.
- In recent years, the development and implementation of digital technologies such as AI, IoT, robots, and sensors have been advancing globally, with the result that the state of the economy and society, including economic activities such as production and consumption, are drastically changing. Against this backdrop, new added value and innovation that should be created through digitalization here are expected to maintain and improve economic growth.

#### [(1) Social and economic challenges]

##### (1) Maintenance and improvement of economic growth

- Japanese economy has been sluggish in recent years even as it maintains growth. For example, the growth rate of real GDP has been moderate compared with other major industrialized nations. The challenge is to maintain and increase economic growth by promoting innovation through an improvement in added value by means of digitalization.

##### (2) Ensuring competitiveness

- As Japan seeks to ensure industrial competitiveness, the challenge is not only to use digitalization as a means of improving business efficiency or saving labor. The nation must also use digitalization to transform organizations, culture, and work styles, thereby creating new products and services, new business models, new added value, and innovation.

#### [(2) Role of digitalization]

##### (1) Creation of new added value

- In recent years, the development and implementation of digital technologies such as AI, IoT, and robots have been advancing globally, with the result that the state of the economy and society, including economic activities such as production and consumption, are drastically changing. Against this backdrop, it is necessary to make efforts to create added value through digitalization.

Example:

- New services such as infrastructure inspections using new drones, sensors, etc.
- Creation of highly flexible and well-designed spaces through construction methods using new technologies such as 3D printers

##### (2) Creation of innovations

- It is necessary to create innovations that are not bound by conventional frameworks by incorporating digital technologies such as AI, IoT, and big data.

Example:

- Initiatives to transform business models, such as digital transformation in the infrastructure field and the real estate field
- New services achieved through the development and implementation of next-generation mobility such as flying cars

#### [Column: Construction of glamping facilities using 3D printers]

- The appeal of construction work using 3D printers is that it can save labor saving and shorten the construction work by finishing the process quickly. It can also produce new architectural values by creating special shapes and textures that can be achieved only with 3D printers.
- In the future, initiatives to provide users with well-designed spaces using 3D printers are expected to enhance experiential value.



Source: Di-Maccio Art Museum, The Forest of Taiyo

- This glamping facility features uneven walls, walls of an egg-shaped building, and curved fences, which have been created with a 3D printer. The core concept is based on how Di-Maccio Art Museum depicts the world. The facility is designed in such a way that it expresses the “symbiosis of art, nature and the universe”, the theme of the museum, which displays paintings by French fantasy artist Gerard Di-Maccio.

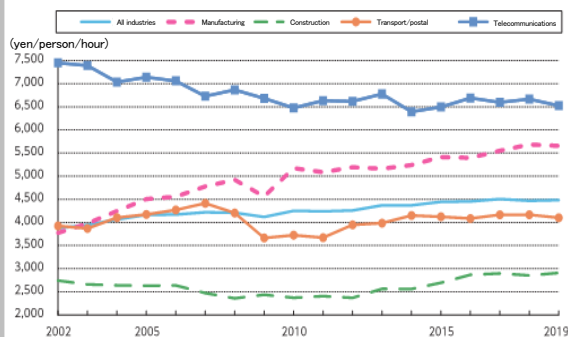
### 3. Promotion of productivity improvement and work-style reform that contribute to solving labor shortages

- Labor productivity in the construction and transportation/postal industries has remained lower than the average for all industries. Workers in Japan have been aging rapidly over the past 20 years, raising concerns that there may be a severe labor shortages in the fields of MLIT in the future.
- While the working-age population is declining, the number of workers is increasing because of rising employment rates among women and the elderly. The labor shortages should be resolved through increased efficiency by means of mechanization and automation, through the promotion of productivity improvement and work-style reform by means of digitalization.

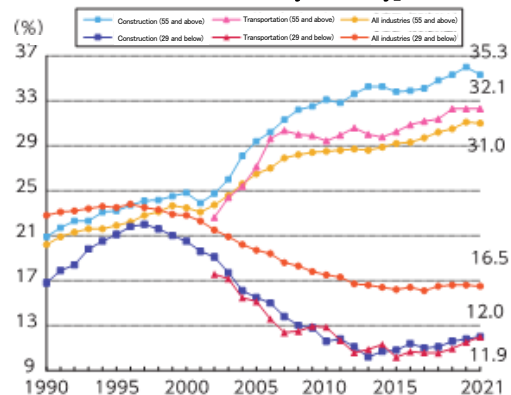
#### [(1) Social and economic challenges]

##### (1) Labor productivity, labor market trends, labor shortages

[Changes in labor productivity in Japan]



[Changes in the age composition of workers by industry]



##### (2) New challenges associated with changes in the employment composition

- Working-age population in Japan, which peaked at 87.26 million in 1995, fell to 75.11 million in 2020 as the birthrate declined and the population aged. However, the total number of workers increased from 64.57 million in 1995 to 67.1 million in 2020. This was due to an increase in the number of woman and elderly (65 and above) workers.
- Employment rates were on an upward trend for both women and the elderly. (The employment rate for women rose from 48.4% in 1995 to 51.8% in 2020, while the employment rate for the elderly rose from 24.2% in 1995 to 25.1% in 2020.)
- As the diversification of worker continues to progress, there is a need to create a comfortable working environment to a variety of workers, including women and the elderly.

#### [(2) Role of digitalization]

##### (1) Productivity improvement

- It is necessary to adopt digitalization to improve labor productivity by reducing the amount of labor required for production per unit.

Example:

- Efficiency improvement of logistics operations by mechanizing and automating picking and palletizing operations in warehouses
- Mechanization and automation of construction work that can be replaced by robots, such as houses, buildings, etc.

##### (2) Promotion of work-style reform

- Work-style reform through mechanization, automation, etc., using digital technology is expected to promote labor participation.
- It is necessary to promote work-style reform by improving the working environment and incorporating advanced technologies in order to make the industry more attractive to workers. Such efforts will facilitate the passing on skills and encourage young people who play important roles in the future to enter the labor market and hold down their job.

Source: Created by MLIT from "Annual Report on National Accounts FY2021" released by the Cabinet Office, "Labor Force Survey" released by the Ministry of Internal Affairs and Communications, and "Monthly Labour Survey" released by the Ministry of Health, Labour and Welfare.

Source: Created by MLIT from "Labor Force Survey" released by the Ministry of Internal Affairs and Communications.

- Labor productivity in Japan (average for all industries) has been increasing since 2002.
- Labor productivity (by field) shows that productivity in the construction and transportation/postal industries remained lower than the average for all industries.
- Workers in Japan have been aging rapidly over the past 20 years.
- In the construction and transportation industries, the percentage of workers aged 55 and above is increasing faster than the average for all industries. The pace of increase in the percentage of workers aged 29 and below remains moderate.
- Among construction workers, those aged 55 and above accounted for 35.3%, while those aged 29 and below 12.0%, in 2021. Among transportation workers, those 55 and above accounted for 32.1%, while those 29 and below 11.9%, in 2021. The both workers are aging. (Source: "Labor Force Survey" released by the Ministry of Internal Affairs and Communications).



# Chapter 1 Digitalization in the fields of MLIT

## Section 1 Challenges facing the nation and the role of digitalization

### 4. Advancement of disaster prevention/mitigation measures to cope with the increasing intensity and frequency of natural disasters

- In recent years, the increasing intensity and frequency of natural disasters have been causing enormous damage. There are also concerns that disaster risks may further increase in the future with climate change. Thus, it is important to implement disaster prevention and mitigation measures that are both tangible and intangible. Japan is an aging society where approximately 30% of the population is 65 and above. The challenge is to be attentive to the needs of each individual, such as a person who requires special care vulnerable to disasters.
- The increasing intensity and frequency of natural disasters should be addressed through disaster prevention and mitigation measures by means of digitalization and the advancement of information provision.

#### [(1) Social and economic challenges]

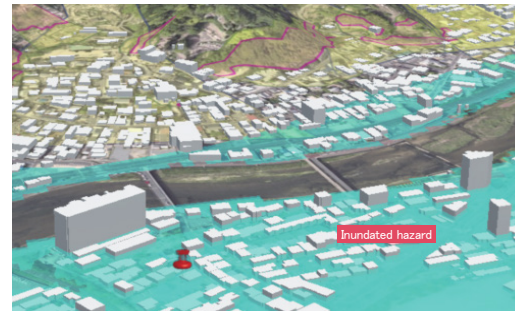
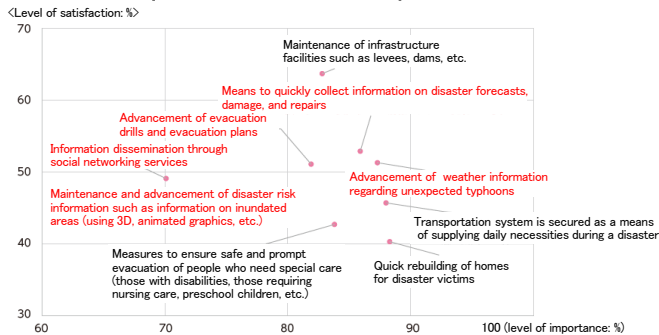
#### [(2) Role of digitalization]

#### (1) Increasing intensity and frequency of natural disasters

#### (1) Advancement of disaster prevention/mitigation measures (Digital disaster prevention measures friendly to people)

##### [Digitalization needs related to disaster prevention and disaster response]

##### [Advancement of disaster risk information using 3D city models]



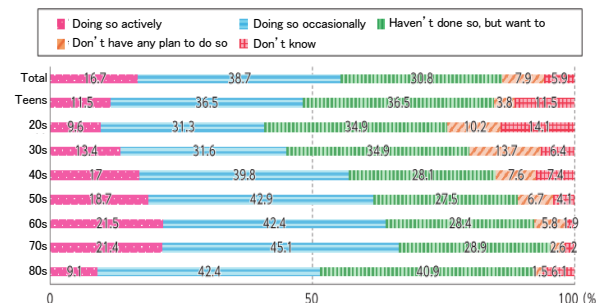
Source: "Public Opinion Survey" released by MLIT

Source: MLIT

- A high percentage of respondents answered that it was important to implement intangible measures, such as the advancement of weather information, means to collect information on disaster forecasts and damage, and evacuation drills and plans.
- Meanwhile, the level of satisfaction was relatively low, indicating that there was a need to implement additional measures that use digital technology.

- Disaster risks should be visualized more clearly by superimposing information on water-related disasters, etc., on the 3D city model so that residents' awareness can be fostered regarding disaster prevention.

##### [The acquisition status of disaster prevention information/disaster information using mobile phones or the internet]



Source: "Public Opinion Survey" released by MLIT

Digital technology should be used to provide disaster-prevention weather information immediately before the disaster, and to share information during emergency response immediately after the disaster (especially during the first 72 hours when it is important to saving lives in particular after the disaster).

#### (Promotion of risk communication)

In order to promote "A Project of River Basin Disaster Resilience and Sustainability by All" throughout a river basin, it is important to establish a system to realize a smooth crisis-management response procedure during a disaster. This should be achieved by facilitating risk communication through the advancement of flood-forecasting technology and the advancement of flood-control measures with the use of digital twins.

#### (Accelerating grasp of disaster damage, labor saving)

Efficient and effective responses through digitalization are required in disaster areas immediately before and after the disaster so that limited personnel can be allocated to tasks that are truly necessary.  
Example: Monitoring of inundate damage using sensors in the real time

#### (2) Advancement of the provision of information regarding disaster prevention/mitigation measures

##### (Disaster information needs)

It is important to promote the effective use of digitalization according to each phase of disaster response-before disaster, after disaster, and during reconstruction.

##### (Advancement of disaster prevention weather information)

In order to reduce the damage caused by torrential rains, it is important to use digital technology to advance disaster prevention weather information that contributes to local disaster response and residents' early evacuation.

Example:

- Enhanced observation by satellite
- Improved computing power for meteorological data and advanced analysis and forecasting technologies

##### (Visualization of disaster risk information)

From a risk-management perspective, it is important to grasp various regional disaster risk information together with location information.

Example: 3D visualization of inundated areas using digital technology

### 5. Efficient use of energy toward the realization of a decarbonized society

- Japan is accelerating its efforts to achieve a 46% reduction in greenhouse gas emissions by FY2030 (compared with FY2013) and carbon neutrality by 2050. The challenge is to reduce energy consumption.
- Digital technology should be used to reduce energy consumption and promote and expand renewable energy.

#### [(1) Social and economic challenges]

##### (1) Challenges toward achievement of a decarbonized society

- Japan is accelerating its initiatives to achieve a 46% reduction in greenhouse gas emissions by FY2030 (compared with FY2013) and carbon neutrality by 2050. As one of them, the nation must reduce its energy consumption.

##### [Public Opinion Survey]

##### [Expectations for increased industrial competitiveness and added value through DX]



Source: "Public Opinion Survey" released by MLIT

- Regarding the development of environmentally friendly buildings (zero-energy homes [ZEHs] and zero-energy buildings [ZEBs]) and transportation (electric vehicles [EVs], fuel-cell vehicles [FCVs], etc.), more than 70% of respondents answered that they had "expectations" ("high expectations" and "somewhat high expectations"), indicating their expectations for the environmental field.

##### [Priority items in the field of smart cities]



Source: "Public Opinion Survey" released by MLIT

- The respondents were asked what should be actively addressed in the field of smart cities. Regarding this question, about 80% agreed with the statement, "Total energy use should be reduced through the application of new technologies, and renewable energy should be promoted". (They answered either "strongly agree" or "somewhat agree".) Thus, they have expectations for initiatives to achieve efficient energy use.

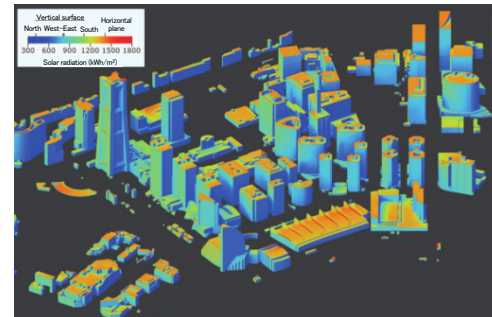
#### [(2) Role of digitalization]

##### (1) Efficient energy use through digitalization

- Japan should achieve a decarbonized society by using energy more efficiently through digitalization.
- Example:
  - Reduce power consumption and carbon dioxide emissions in the supply chain and in the logistics industry through automated controls by means of electrification and the use of digital twin platforms, etc.
  - Improve the efficiency of energy use and reduce the movement of people and goods while measuring environmental data and forecasting environmental conditions using ICT in various activities involving not only businesses but also ordinary households
  - Utilize digital technology to expand the use of renewable energy through the development of solar-power generation capabilities, etc., thereby reducing carbon dioxide emissions in each region

##### [Column: Estimates for the solar power generation capabilities of photovoltaic walls using a 3D urban model]

- MLIT is conducting a demonstration project to estimate the power-generation capabilities of building walls, etc., in urban areas, which are heavily affected by building shadows. MLIT combines a 3D urban model with meteorological data, etc., for this purpose. MLIT is studying and developing algorithms for estimating the actual power-generation capabilities of building walls, and the verification of the accuracy of such estimates.



- Digital technology may lead to increased use of renewable energy through the development of solar-power generation capabilities, etc., thereby reducing carbon dioxide emissions in each region.

Source: MLIT

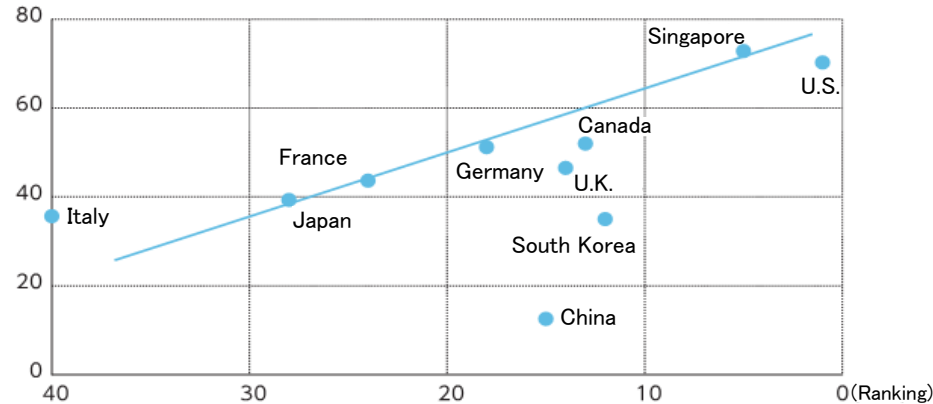
### 1. Toward the formation of a world-class digital society

- Chapter 1, Section 2 describes the current status of digital implementation. Specifically, it discusses the current status of digitalization in Japan, the Vision for a Digital Garden City Nation, and initiatives in the fields of MLIT, as well as expectations for solving social challenges through future digitalization.
- The formation of a digital society will be led by the Digital Agency, which was established in 2021. The national government, local governments, the private company, etc., while taking global trends into account, must work together to promote initiatives such as the digitalization of government procedures and the securing of IT personnel.

#### [(1) Japan's current status regarding digitalization]

##### [Global digital competitiveness ranking and GDP per capita]

(GDP per capita)  
(US \$ × 10<sup>3</sup>)



Source: Created by MLIT from IMD World Digital Competitiveness Ranking (2021) on the World Bank website

- Japan ranks 28th among the 63 countries surveyed and sixth among the seven major developed countries.
- In the seven major developed countries, there is a correlation between GDP per capita and the World Digital Competitiveness Ranking. Countries with advanced digitalization tend to have higher GDP per capita.

##### [Online usage rates for government procedures by country (2018)]

- The online usage rate for government procedures (the percentage of individuals who filled out and submitted forms through government websites) was the lowest in Japan (7.3%) among the 30 countries (such as OECD nations) that responded to the survey, indicating that there was still room for improvement.

##### [Trends regarding IT investment and IT personnel supporting digitalization]

- IT investment has been increasing in major industrialized countries since 2000, but it has remained flat in Japan. The number of IT personnel as a percentage of the overall workforce is low in Japan compared with other developed countries. Thus, it is important to ensure the availability of IT personnel in Japan.

#### [(2) Toward the formation of a world-class digital society]

- The Digital Agency was established in September 2021 based on the recognition that Japan may lag behind and suffer a decline in international competitiveness unless it responds to the advancement in digital technology.
- The creation of the Digital Agency is the first step toward the realization of a digital society in Japan. The country will create a future vision for the digital society based on the Priority Policy Program for Realizing Digital Society (released on June 7, 2022). Toward this goal, the national government, local governments, private companies, etc., will work together to promote initiatives such as digitalization of government procedures and the securing of IT personnel.

## 2 . Vision for a Digital Garden City Nation and initiatives in the fields of MLIT

- Japan should create new services that contribute to better jobs and lives in regional areas, improve sustainability, and realize well-being. Toward this end, it is important to promote efforts to realize the Vision for a Digital Garden City Nation, an initiative to create a society where citizens and employee can enjoy the benefits of digitalization.
- It is important to consider the characteristics of digitalization and incorporate it effectively, taking account of trends in digital technologies such as AI, drones, robotics, and automated driving technologies, in order to solve various social challenges.

### [Toward the realization of the Vision for a Digital Garden City Nation]

- Based on the Vision for a Digital Garden City Nation (released in December 2022), the government will seek to ease the excessive concentration of people in the Tokyo metropolitan area in an effort to create a multipolar society. The goal is to enable people living and working in regional areas to access information and services comparable to those in urban areas. In this way, the government will turn social challenges in regional areas into a driving force for growth and realize bottom-up nationwide growth that begins from regional areas.

### [(2) Current status of digitalization in regional areas] (1)

- Our lives, economy, and society are about to be drastically transformed by technological innovations of the Fourth Industrial Revolution, such as AI (equivalent to the human brain), IoT (equivalent to the human nervous system), robots (equivalent to human muscles), and sensors (equivalent to the human eyes). In the fields of MLIT, too, we must actively adopt technological innovations to enrich the lives of individual citizens and support the economy and society.
- It is important to consider the characteristics of digitalization and incorporate it effectively in accordance with each objective, while taking account of changes resulting from the progress of ICT and trends in cutting-edge technologies, in order to solve various social challenges through digitalization. What follows is a summary of the current status of digitalization, mainly in the fields of MLIT, with a focus on digital technology.

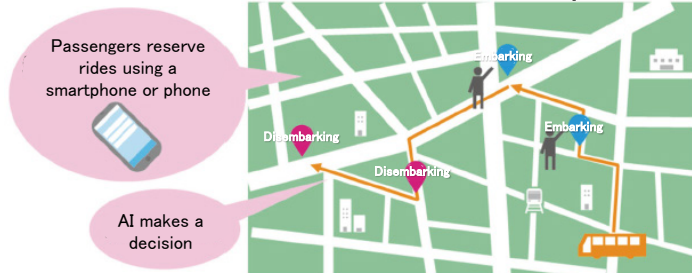
### 2. Vision for a Digital Garden City Nation and initiatives in the fields of MLIT

#### [(2) Current status of digitalization in regional areas] (2)

##### [AI]

- Artificial intelligence (AI) is being used in various fields such as transportation, logistics, medicine, and disaster management, in tandem with the spread of computers, smartphones, and the internet. AI is already permeating our daily lives.
- AI makes conventional public transportation services more efficient and diverse. For example, AI on-demand transportation uses AI to optimize vehicle dispatch in real time in response to user reservations. This is expected to lead to more efficient use of limited resources. For example, transportation could be secured in rural areas where demand is low and profitability is difficult to achieve. Also, diversification of transportation services in urban areas and elsewhere may make our lives more convenient.

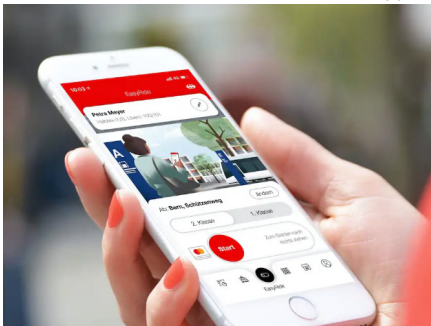
##### [AI on-demand transport]



Source: "Public Opinion Survey" released by MLIT

##### [Column: A service that enables the use of multiple modes of transportation with a single ticket]

(MaaS app SBB Mobile [Switzerland])



©Schweizerische Bundesbahnen (SBB)

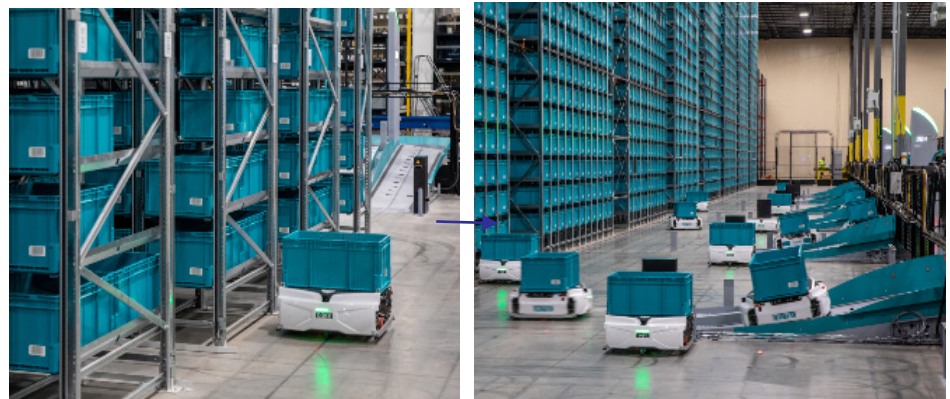
- ❑ Users will be able to search, book, and pay for multiple modes of transportation with a single app. They will be able to transfer between various modes of transportation such as trains, buses, and ships without a ticket.
- ❑ AI estimates the travel routes based on GPS information, etc., and calculates ticket prices by combining the discount amount, time-zone price variables, etc., so that they will be lower than regular prices. It then charges the user for the ticket.

##### [Robots]

- Robots, in addition to assisting and supplementing various tasks, enable labor-saving through automation and remote control.
- Robots, when used in various areas in the fields of MLIT, may assist and supplement people's work and contribute to solving social challenges, such as the improvement of productivity and the work environment.

##### [Column: Use of robots in warehousing operations]

(Picking robots that automatically load packages)



Source: IHI Corporation

- ❑ At the logistics facility MFLP Funabashi III, picking robots (3D picking system) were adopted for warehousing operations in 2022. This has led to the mechanization and automation of picking operations in the warehouse as a labor-saving measure.

### 2. Vision for a Digital Garden City Nation and initiatives in the fields of MLIT

#### [(2) Current status of digitalization in regional areas] (3)

##### [Drones]

- Drones are expected to contribute to improved productivity in the construction and logistics industries, which are experiencing increasing labor shortages.
- In the construction field, automatically controlled ICT construction machinery, augmented reality technology, etc., should be used along with 3D observation technology involving drones. It is important to advance infrastructure development and maintenance management using such new technologies and improve productivity.

[Column: Delivery experiment involving the collaboration between drones and delivery robots]



Source: JAPAN POST Co., Ltd.

- Since December 2021, Japan Post has been conducting Japan's first demonstration experiment for delivery services that involve the collaboration between drones and delivery robots. Such initiatives are expected to help ensure the sustainability of logistics services, especially in mountainous areas where there are concerns about future labor shortages.

[Column: Advancement of infrastructure development and maintenance through augmented reality (AR)]  
 (Using AI to visualize the completion of a sabo work site damaged by a torrential rain)



Source: MLIT

- MLIT has been carrying out the construction of the Souzugawa sabo dam in an efficient manner by utilizing drones, 3D models, and ICT construction machinery. Initiatives are underway to visualize construction work. Such initiatives involve the use of laser scanners and drones to acquire 3D topographical data for the use of 3D models, etc., so that the image of a completed project can be shared between those placing orders and those receiving them, and among site workers.

##### [Automated driving]

- Self-driving vehicles are expected to help reduce traffic accidents, secure transportation for the elderly, etc., in underpopulated areas, and solve issues such as driver shortages.
- Until now, community development, such as the planning for roads and streets, has been pursued based on the assumption that vehicles are driven by humans. However, it is now necessary to consider how infrastructure should be designed for next-generation mobility that uses automated-driving technology, etc. Infrastructure support for self-driving vehicles is required for the use of automated-driving technology.

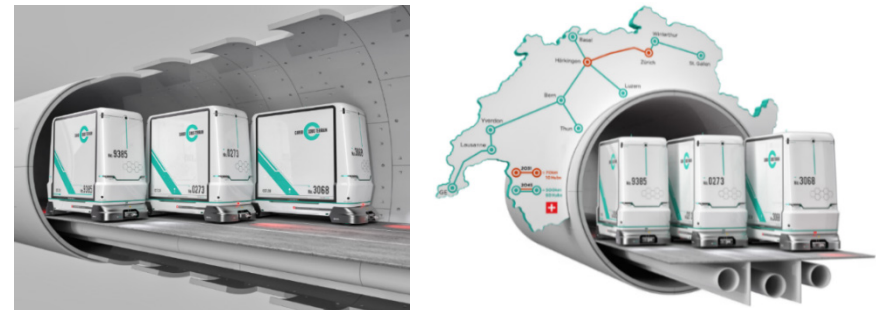
##### [Automated-driving levels]

Periphery monitoring by the automated system	Level 5	Unmanned driving anytime, anywhere		
	Level 4	Automated driving under certain conditions (Safety is ensured by the vehicle even if these conditions do not apply)	Enables: -Unmanned driving, etc.	Driver-free
	Level 3	Automated driving under certain conditions (Safety is ensured by the driver if these conditions do not apply)	Enables: -Careful screen monitoring -Use of mobile phones, etc.	Eyes-free
* "Certain conditions" include speeds of 50 km/h or less, clear skies, highway driving, etc.				
Periphery monitoring by the driver	Level 2	Front-rear, right-left driving support	Enables: -Automatic lane change (under the driver's supervision), etc.	Hands-free
	Level 1	Driving support in one direction only (either front/rear or right/left)	Enables: -Automatic braking -Automatic maintenance of distance between vehicles	Foot-free

Source: MLIT

[Column: Application of new technologies such as automated driving to freight transport]

(Cargo Sous Terrain [CST] project in Switzerland)



©Cargo Sous Terrain (CST)

- A tunnel with a diameter of six meters is built 20–100 meters underground. In the tunnel, modular transport units with temperature-controlled interiors travel at 30 km/h in the freight lanes. The transport units are fully automated and operate 24 hours a day, 365 days a year. In addition to regular cargo, they can also transport perishable and refrigerated goods.

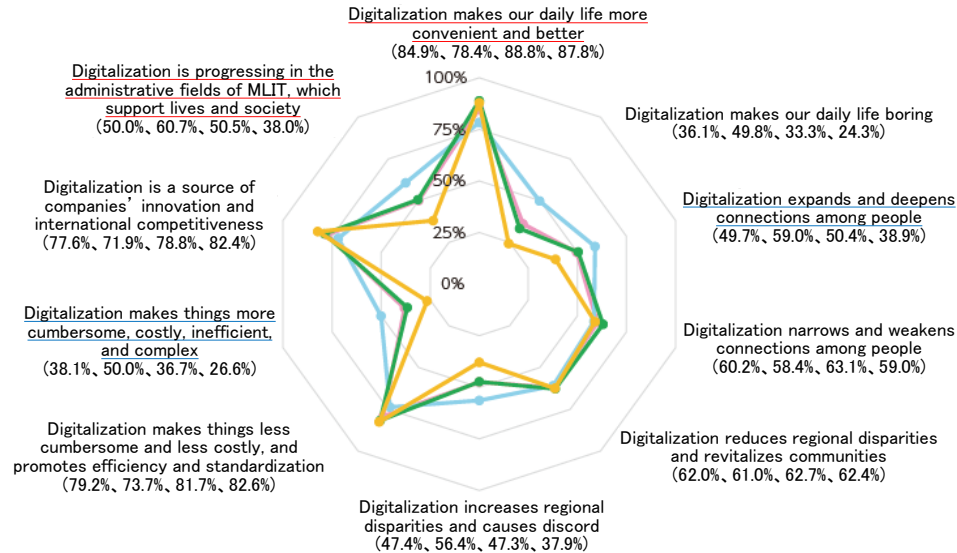
## 3. Expectations for solving social challenges through future digitalization (1)

- People's perception of digitalization varies by age group.
- With respect to whether people are currently living a life that can be made possible through digitalization and their intention for the future, it can be observed that their plan is to use digital technology for services that are closely connected to their lives.

### [Attitudes toward digitalization]

#### [How digitalization is perceived]

— Total — 30s — 40s-50s — 60s-



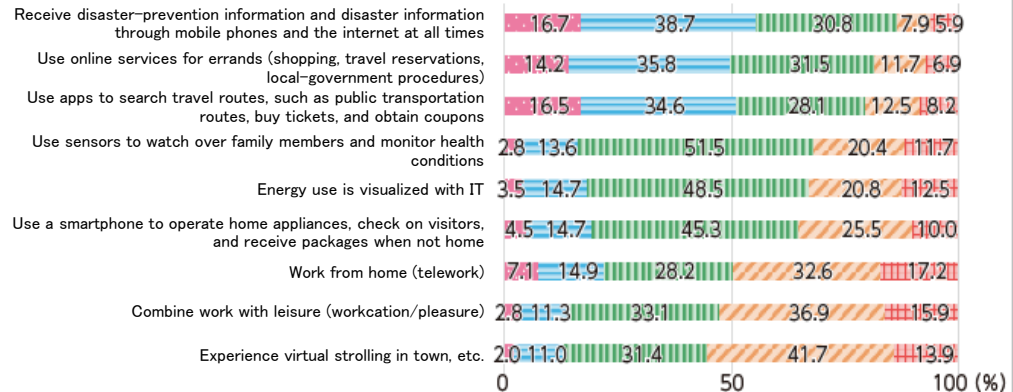
Source: "Public Opinion Survey" released by MLIT

- By age, about 60% of those under 30 responded that "digitalization expands and deepens connections among people". The figure was 40% among those aged 60 and above.
- A total of 50% of the respondents answered that "digitalization is progressing in the administrative fields of MLIT, which support lives and society". About 60% of those under 30 and 40% of those who were 60 and above chose this answer. Thus, it can be observed that people's perception of digitalization varies by age.

### [Digital use in daily life and intention for the future]

#### [Whether people are currently living a life that can be made possible through digitalization and their intention for the future]

■ Doing so actively    
 ■ Doing so occasionally    
 ■ Haven't done so, but want to  
■ Don't have any plan to do so    
 ■ Don't know



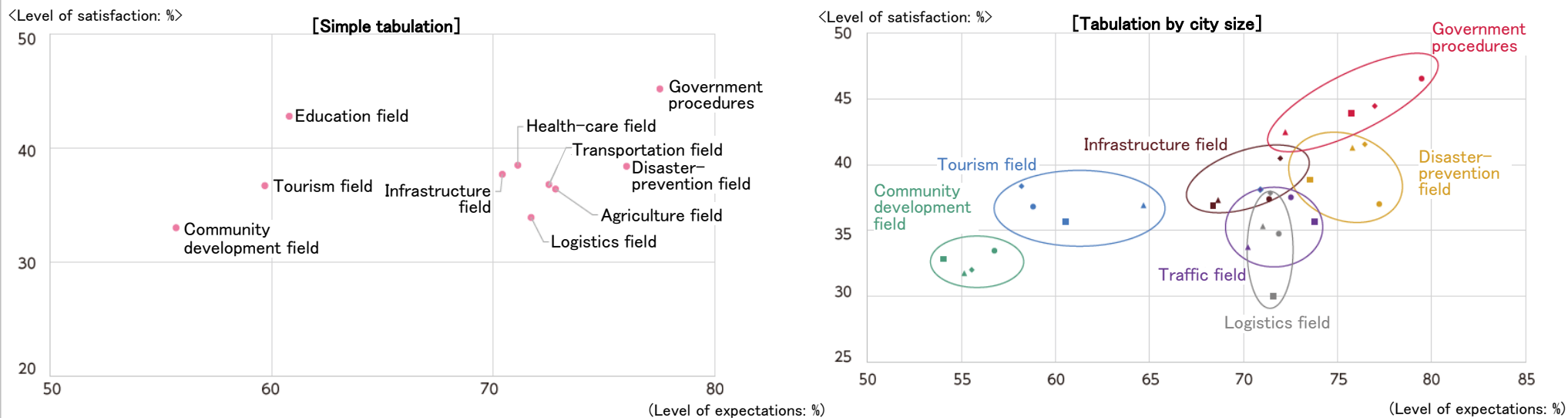
Source: "Public Opinion Survey" released by MLIT

- People were asked about their digital use in their lives and their intention for the future. A majority of the respondents answered affirmatively to the following: "Receive disaster-prevention information and disaster information through mobile phones and the internet at all times", "Use apps to search travel routes, such as public transportation routes, buy tickets, and obtain coupons", and "Use online services for errands (shopping, travel reservations, local-government procedures)". Including those who answered that they would like to do so, the figure reaches about 80%.
- The results indicate their intention to use digital technology for services that are closely connected to their lives.

## 3. Expectations for solving social challenges through future digitalization (2)

- Regarding people's expectations for solving social challenges through digitalization and their satisfaction, the level of expectations exceeded 50% in all fields. In "DX for government procedures" and "DX in the field of disaster prevention", the level of expectations was at least 70%. Unlike the level of expectations, the level of satisfaction was below 50% for all items. Thus, there is room for further efforts.
- Regarding government procedures, which had the highest level of expectations, the level of expectations and the level of satisfaction both tended to be higher in large cities, indicating that there were differences based on city size.

[The level of expectations and the level of satisfaction with respect to solving social challenges through digitalization]



Source: "Public Opinion Survey" released by MLIT

- The level of expectations exceeded 50% in all fields. In particular, the level was 70% or higher for "online government procedures and electronic certification (DX for government procedures)", "measures against increasing intensity and frequency of natural disasters using digital technology (DX in the disaster-prevention field)", "smart agriculture using AI, drones, etc. (DX in the agriculture field)", "online medical care and electronic medical records (DX in health care)", "new mobility and transportation systems, and transportation transformation through MaaS, etc. (DX in the traffic field)", "the introduction of robots such as unnamed transport vehicles (mechanization), the introduction of data infrastructure (digitalization) etc. (DX in the logistics field)".
- Unlike the level of expectations, the level of satisfaction was below 50% for all items. Thus, it can be observed that there is room for further efforts.



# Chapter 1 Digitalization in the fields of MLIT

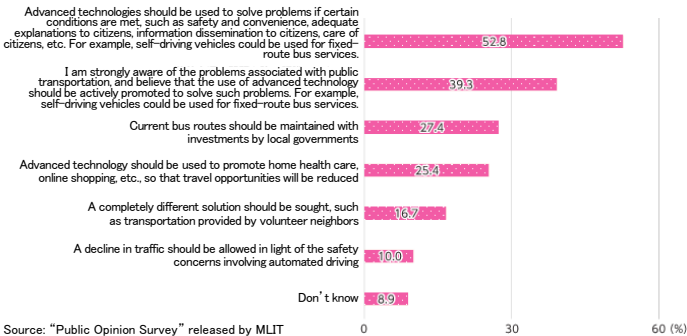
## Section 2 Current status of digital implementation and expectations for the future 3. Expectations for solving social challenges through future digitalization

### 3. Expectations for solving social challenges through future digitalization (3)

- The Japanese government is working in union to promote digitalization in all fields. In particular, MLIT is pursuing the digitalization of government procedures while promoting initiatives to support lives and society in the fields of disaster prevention, transportation, community development, logistics, and infrastructure.
- There are high expectations for the use of digital technology to solve various social issues, such as the difficulty maintaining public transportation and worker shortages in the logistics and infrastructure fields.
- As for the degree of priority regarding the measures that should be implemented, more than 60% of the respondents answered that all the survey items were of high priority.

#### [Expectations for solving social challenges through digitalization]

##### [Traffic field and community development field]



Source: "Public Opinion Survey" released by MLIT

- The following responses were obtained from a high percentage of people: "Advanced technologies should be used to solve problems if certain conditions are met, such as safety and convenience, adequate explanations to citizens, information dissemination to citizens, care of citizens, etc. For example, self-driving vehicles could be used for fixed-route bus services". "I am strongly aware of the problems associated with public transportation, and believe that the use of advanced technology should be actively promoted to solve such problems. For example, self-driving vehicles could be used for fixed-route bus services".
- This indicates that a certain number of people are supportive of the use of advanced technologies to solve various problems, such as through the introduction of self-driving vehicles, provided that safety and convenience are ensured and that citizens are fully informed about such plans.

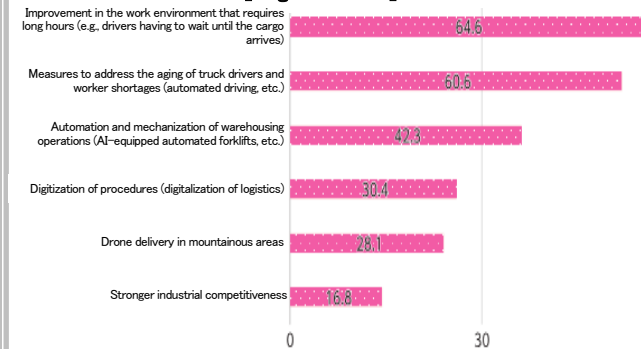
##### [Column: Application of automated driving technology to passenger buses]



Source: Sakai Town, Ibaraki Prefecture

- Sakai Town in Ibaraki Prefecture launched a self-driving bus service in November 2020 to ensure that the elderly and those raising children have access to transportation. The self-driving buses operate on a regular schedule and run on fixed routes to support people's daily lives. This is the first initiative in Japan in which a municipality operates self-driving buses on public roads on a regular schedule.

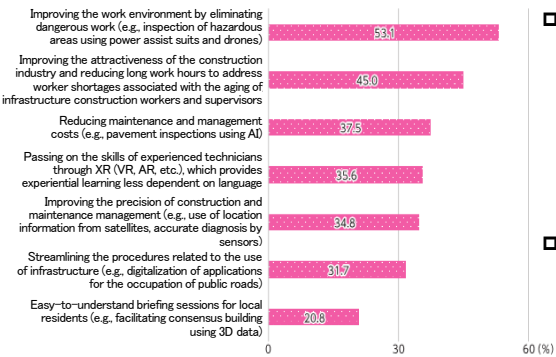
##### [Logistics field]



Source: "Public Opinion Survey" released by MLIT

- The following responses were obtained from a high percentage of people: "improvement in the work environment that requires long hours (e.g., drivers having to wait until the cargo arrives)" and "measures to address the aging of truck drivers and worker shortages (automated driving, etc.)".
- This indicates that many people believe that improving the work environment and addressing the shortage of workers should be prioritized.

##### [Infrastructure field]

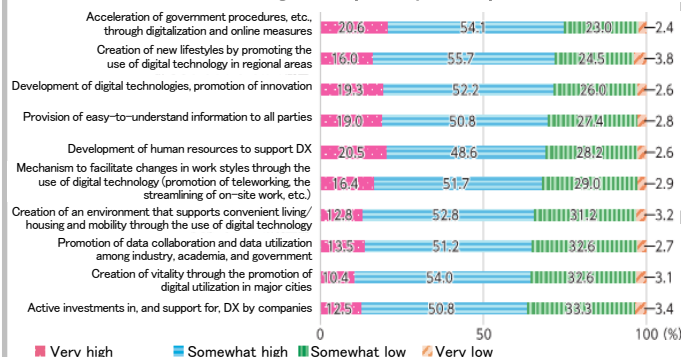


Source: "Public Opinion Survey" released by MLIT

- The following responses were obtained from a high percentage of people: "improving the work environment by eliminating dangerous work" and "improving the attractiveness of the construction industry and reducing long work hours to address worker shortages associated with the aging of infrastructure construction workers and supervisors".

- This indicates that many people believe that improving the work environment and addressing the shortage of workers should be prioritized.

##### [Degree of priority of required measures]



Source: "Public Opinion Survey" released by MLIT

- As items of "very high" priority, about 20% of the respondents chose "acceleration of government procedures, etc., through digitalization and online measures", "development of human resources to support DX", "development of digital technologies, promotion of innovation", etc. This indicates that the respondents, who have high expectations for government procedures, also have a high level of interest in improving the situation related to human resources, technology, etc.

- The second most common responses were: "creation of an environment that supports convenient living/housing and mobility through the use of digital technology" and "creation of new lifestyles by promoting the use of digital technology in regional areas". This indicates that people seek to use digital technology for their living environment and life styles.

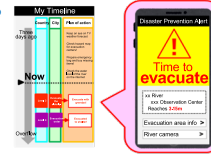
## Section 1 Direction of measures for digitalization by MLIT

- Chapter 2, Section 1 summarizes the direction of measures for digitalization by MLIT. MLIT seeks to further promote “digitalization in the fields of MLIT”, such as disaster prevention, transportation, community development, logistics, infrastructure, and government procedures, amid the rapid progress of digitalization in recent years.
- In promoting measures for digitalization, MLIT will make initiatives to achieve “people-friendly digitalization” so that everyone can enjoy its benefits. MLIT will take into account the diverse environments and needs of each individual and pursue the matter meticulously from the user’s perspective. In particular, MLIT will ensure that optimal services are provided according to the needs of individuals, focusing on digitalization in areas closely connected to people’s lives, such as disaster prevention and transportation.

*Ensure that government procedures can be completed online which the progress is relatively slow, improve convenience for citizens and make operations more efficient*

### Promote digitalization of government procedures

*Improve the accuracy of forecasts, visualize disaster risk, provide real time information, etc., to promote advanced and efficient disaster prevention measures during normal times and at the time of a disaster*



Community development

Disaster prevention

Transportation

*Achieve the social implementation of MaaS and automated driving on a full scale to “redesign” (reorganize) local public transportation networks and make them more convenient, sustainable, and productive*

*Use AI, IoT, and digital twins to realize a “human-centered Urban Development” that supports good life and diverse lifestyle/workstyle*

Accelerate digitalization measures in each field



Infrastructure

*Transform how infrastructure is created and used, and how data are utilized, using ICT construction, 3D data (BIM/CIM), etc.*

Digital platform

*Link various data to promote advanced policy measures and create innovation*



Logistics

*Transform logistics through mechanization and digitalization to promote work-style reform, improve productivity in the logistics industry, and achieve international competitiveness*

### 1. Measures for digitalization in the field of disaster prevention

- There are limits to conventional responses as natural disasters become more intense and frequent. It is essential that initiatives are taken in the information field.
- MLIT will pursue digitalization in all phases of disaster management, i.e., normal times, immediately before the disaster, and immediately after the disaster. MLIT will further promote people-friendly digitalization in the disaster prevention field in accordance with the situation of each individual citizen. The initiatives will include responses to regional disaster risks, meticulous disaster prevention and mitigation measures, the provision of disaster-prevention information, and evacuation support.

#### [(1) Current status and future direction]




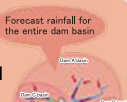


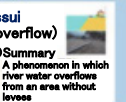
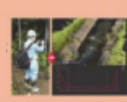
- MLIT has been working on intangible measures, as well as tangible measures. Intangible measures include initiatives to provide more advanced weather information, secure means of collecting information on disaster forecasts and damage, etc., and promote more advanced evacuation drills and evacuation plans. These were in addition to tangible measures, such as initiatives to maintain levees and dams, and initiatives to secure transportation and rebuild homes in the event of a disaster. However, there are limits to such conventional measures.
- Going forward, MLIT will drastically improve its disaster prevention and mitigation measures through the following initiatives: (1) Initiatives to make disaster prevention and mitigation measures drastically more advanced and efficient (promotion of “River Basin Disaster Resilience and Sustainability by All” using digital technology, development of digital twins to visualize technological development and the effects of countermeasures, and rapid grasp of damage using digital technology); (2) Initiatives to use satellites and supercomputers (advanced disaster mitigation information using digital technology and early detection of landslides using satellites).

#### [(2) Development of future measures]

##### (1) Initiatives to make disaster prevention and mitigation measures drastically more advanced and efficient

###### (Promotion of “River Basin Disaster Resilience and Sustainability by All” using digital technology)

- Improving the accuracy of forecasts and providing real time information, etc., to make disaster prevention/weather information more advanced.

Normal times	During disaster	Example of “River Basin Disaster Resilience and Sustainability by All”
<p>Enhance risk information, make it available to the public</p> 	<p>Monitoring inundated areas in real time using sensors and providing information</p> 	<p><b>&lt;Residents&gt;</b></p> <ul style="list-style-type: none"> <li>✓ Increased awareness of disaster prevention</li> <li>✓ Appropriate choice of action can be made</li> </ul> <p><b>&lt;Local government&gt;</b></p> <ul style="list-style-type: none"> <li>✓ Effective “River Basin Disaster Resilience and Sustainability by All” through risk communication</li> <li>✓ Accurate crisis management response and realization of early recovery/restoration</li> </ul> <p><b>&lt;River administrator&gt;</b></p> <ul style="list-style-type: none"> <li>✓ Effective “River Basin Disaster Resilience and Sustainability by All” through risk communication</li> <li>✓ Advanced operations of flood control facilities, promotion of disaster-prevention actions, and realization of rapid disaster response</li> </ul>
<p>Visualize the effects of digital-twin measures, visualize risks</p> 	<p>Forecast rainfall for the entire dam basin</p> <p>Advancement of flood forecasting and dam operations for the entire basin using forecasting technology</p> 	
<p>Evacuation support using digital technology</p> 	<p>Use AI to forecast inflows of dam using AI</p> 	
<p>Easy-to-understand dissemination of information</p> <p><b>Issui (overflow)</b>  <b>OSummary</b>                      A phenomenon in which river water overflows from an area without levees</p> 	<p>Enhanced disaster response with the use of digital technology.</p> 	

Use of My Timeline and dissemination of disaster information to urge evacuation

##### (2) Initiatives to use satellites and supercomputers

###### (Use of digital technology to make disaster mitigation information more advanced)

- In forecasting stationary linear mesoscale convective systems, Japan Meteorological Agency is strengthening the computer system, using supercomputer “Fugaku” of RIKEN, and pursuing technology development through industry-academia-government collaboration.

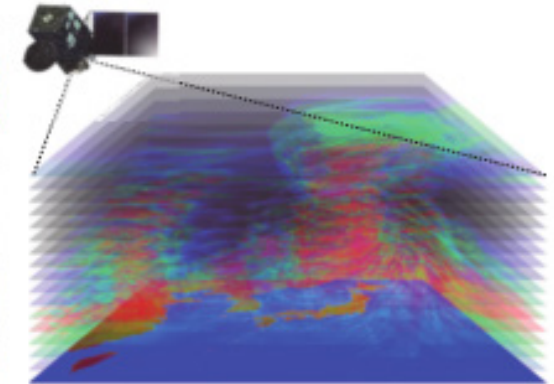
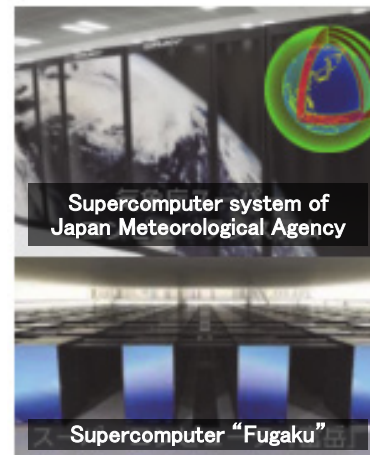


Image of 3D observation by the next-generation geostationary meteorological satellite (3D structure of the atmosphere)

### 2. Measures for digitalization in the field of urban development (1)

- In order for community development to serve as a platform for creating new values, digital transformation is necessary as a means of transforming the traditional community development framework and realizing new value creation and problem solving.
- Along with smart-city initiatives and the development of 3D city models, MLIT will promote the use of new technologies and data to realize human-centered urban development.

#### [(1) Current status and future direction]

- In FY2022, MLIT compiled “vision for realizing digital transformation in community development”. Based on this vision, MLIT will promote measures for liberating people from various restrictions related to space, time, and relationships involving urban development as it transforms the existing framework by using the internet, IoT, AI, digital twin technology, etc. In this way, MLIT will work toward the realization of “Human-centered Urban Development” which sustains good life and diverse lifestyle/workstyle, and aim to create new urban values such as “sustainable urban management”, “enhanced well-being”, and an “agile and flexible urban design”.
- Going forward, MLIT will pursue advanced urban development through (1) smart-city initiatives aimed at improving the lives of citizens, (2) initiatives to make community development more advanced through the use of 3D city models, (3) initiatives to create new services and tourism urban development with the use of new technologies, and (4) initiatives to improve the quality of living environment through the use of IoT technology.

#### [(2) Development of future measures (1)]

##### (1) Smart-city initiatives to improve lives of citizens.

- MLIT supports demonstration projects designed to achieve the implementation of advanced urban services. It also distributes Smart City Guidebook, which incorporates the knowledge gained in the process.
- MLIT will continue to promote measures regarding smart-cities in cooperation with the Cabinet Office, the Ministry of Internal Affairs and Communications, and the Ministry of Economy, Trade and Industry.



Source: Smart City Guidebook

#### [Example of community development]

##### (Column: Realization of “human-centered community development” through AI, IoT, and digital twins)



Hakobo® developed by Panasonic Holdings Corporation

- In the Otemachi, Marunouchi, and Yurakucho areas, under the concept of “Smart & Walkable”, a demonstration experiment was carried out in FY2022 with the use of a conveyor robot that was fully remotely monitored and operated. The objective was to examine the redesigned urban vision in which robots and other mobility systems assist, and coexist with, pedestrians and people relaxing on the street.
- The robot runs on a designated route that includes public roads, and stops at certain locations to sell capsule toys, beverages, and other items unattended.

Source: The Council for Area Development and Management of Otemachi, Marunouchi, and Yurakucho

## 2. Measures for digitalization in the field of community development (2)

### [(2) Development of future measures (2)]

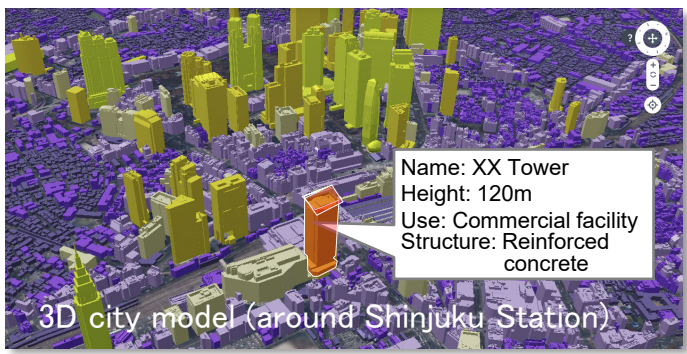
#### (2) Initiatives to make community development more advanced through the use of 3D city models.

##### (Project PLATEAU)

- Under this project, 3D city models were developed for approximately 130 cities across Japan (as of the end of March 2023). To foster open innovation in various fields by collaborating with various actors in both the public and private sectors, MLIT provide these models as open data.
- The medium to long term goal is to cover 500 cities by FY2027, make further efforts to promote the development and use of 3D city models, and promote of open data.

#### Creation of 3D city models

- The entire city landscape is reproduced as data, while individual objects such as buildings retain attribute information such as their use and structure. In this way, not only the “shape” but also the “meaning” is converted to data.
- In FY2020, an inexpensive maintenance mechanism was established with the reuse of existing data such as those of city planning geographical information systems owned by local governments.



Source) MLIT

#### (3) Initiatives to create new services and communities that attract tourists through the use of new technologies.

[Example of the use of AR, VR and other digital tools for tourism]  
(Column: Initiatives to create new services and develop communities that attract tourists through the use of new technologies)



- Virtual-reality technology enables users not only to see existing bombed buildings, such as the Atomic Bomb Dome, but also experience the cityscape of the past and what it was like at the time of the bombing. This is expected to create opportunities for people to think about war and peace.

### 3. Measures for digitalization in the field of transportation (1)

- So far initiatives have been made to develop efficient transportation systems to meet increasing transportation demand. However, a number of regions where are finding it difficult to maintain or secure transportation services are increasing. Digitalization is transforming transportation, calling into question the way in which the system is governed and regulations are imposed.
- MLIT will promote the “redesign” (reorganization) of local public transportation networks through the social implementation of MaaS and automated driving.

#### [(1) Current status and future direction]

- Local public transportation systems provide services that are essential for people’s lives and economic activities. However, many bus company continue to face difficulties because of the impact of COVID-19, in addition to the long term decline in demand associated with a population decline, a falling birthrate, the widespread use of private cars, and changing lifestyles.
- MLIT promotes the “redesign” (reorganization) of local public transportation networks to make them more convenient, sustainable, and productive through digital transformation/green transformation and through collaboration and cooperation (co-creation) with local stakeholders, utilizing various policy tools, including the legal system, budget, and tax measures.
- Going forward, MLIT will work toward a shift to a next-generation transportation system through (1) initiatives for MaaS is a new mobility service, and (2) initiatives toward the realization of automated driving.

#### [(2) Development of future measures (1)]

##### (1) Initiatives for MaaS is a new mobility service

- MLIT supports initiatives related to the implementation of MaaS throughout Japan in cooperation with other ministries and agencies. Since data linkage among transportation service operators is important for the spread of MaaS, MLIT has formulated “guidelines for MaaS-related data linkage (revised in April 2021)”. In this way, MLIT is developing an environment conducive to data linkage.

##### (2) Initiatives to realize automated driving

###### (Automated vehicle driving)

- In April 2018, MLIT formulated “a policy framework for the establishment of an institutional foundation related to automated driving” in order to promote initiatives to introduce public transportation services utilizing automated driving. MLIT has made necessary preparations, including the practical implementation of advanced automated driving at Level 3 or higher, and conducted demonstration tests on automated driving services on public roads and at roadside stations.

###### (Automated operations of trains)

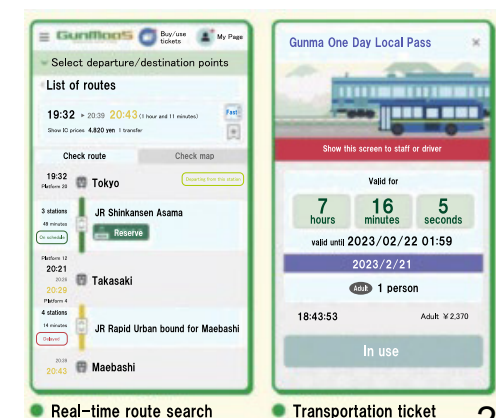
- MLIT will support the development of a system that automatically detects obstacles in front of a train using a stereo camera installed on the train driver’s cab. It will also consider automating the tasks that are currently performed by train drivers, such as the monitoring of the passenger condition, train control, and headlight operations.

##### (Maritime Autonomous Surface Ships (MASS))

- MLIT has conducted demonstration projects on technology for MASS since FY2018 with the aim of achieving the practical use of MASS by 2025. In February 2022, MLIT developed “Safety guidelines for MASS”, which contains key points to consider in design, installation and operation phases of MASS. Japan will continue to make efforts, including the contribution to the development of international regulations, to achieve the practical use of MASS globally.

##### [Example of MaaS implementation initiatives]

(Column: Providing services to local residents by linking transportation IC cards with individual number cards)



## 3. Measures for digitalization in the field of transportation (2)

[(2) Development of future measures (3)]

[Example of initiatives for next-generation mobility]

(Column: Initiatives for the realization of Advanced Air Mobility (AAM), which is expected to become the next generation of mobility)



©SkyDrive

[Example of the use of humanoid robots]

(Column: Toward the use of humanoid robots for the maintenance of railroad overhead lines)

<Example of humanoid robot (general purpose humanoid heavy machinery)>



Source: JR West Japan (West Japan Railway Company)

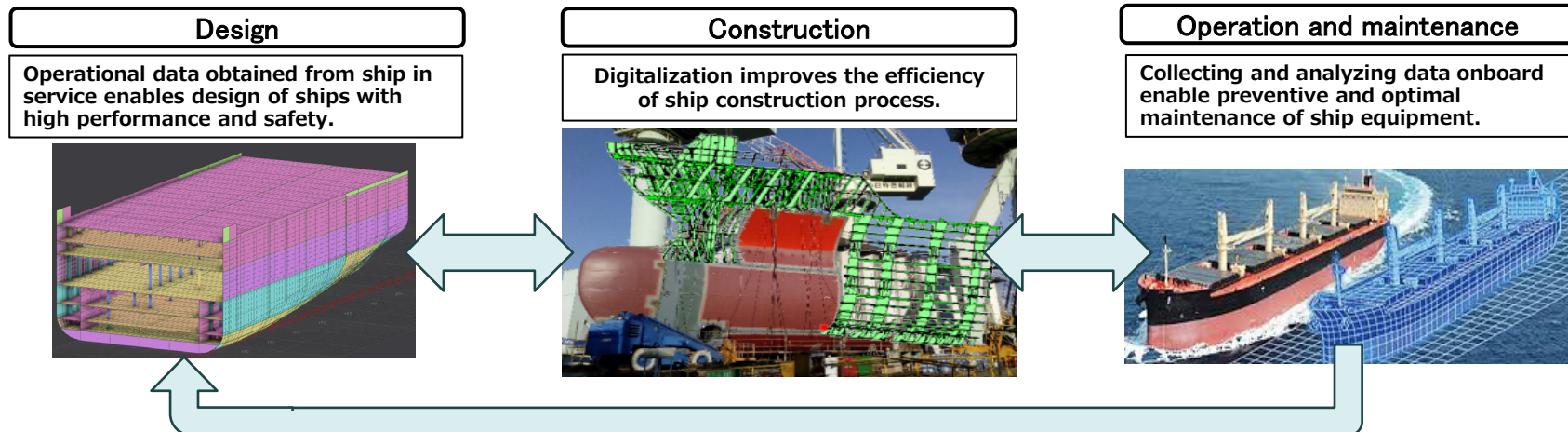
<Operator of general purpose humanoid heavy machinery>



[Example of digitalization in the shipbuilding industry]

(Column: Digital Transformation of shipyards which contributes to the sustainability of marine transport [DX shipyard])

<Digital Transformation of ship design, construction, operation and maintenance>



Source) MLIT

### 4. Measures for digitalization in the field of logistics

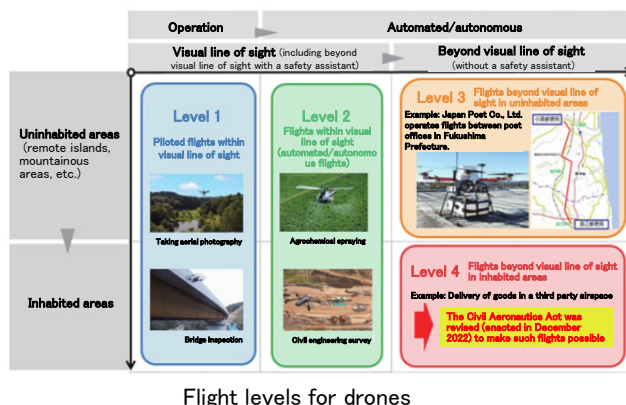
- In the logistics industry, there are concerns that the labor shortage may become even more serious because an overtime cap will soon be imposed for truck drivers. Thus, productivity improvement is an urgent task for the logistics industry, which must also address carbon neutrality.
- MLIT will promote the mechanization and automation of logistics facilities, use of drones for logistics operations, establishment of logistics and distribution data infrastructure, and standardization of logistics.

#### [(1) Current status and future direction]

- MLIT will further promote “logistics DX”, which involves mechanization and automation of logistics facilities, use of drones in logistics operations, and establishment of logistics and distribution data infrastructure. MLIT will also pursue logistics standardization, which is a prerequisite for logistics DX. In doing so, MLIT will take into account “The Comprehensive Physical Distribution Policy Outline (FY2021–FY2025)” approved by the Cabinet in June 2021.
- MLIT will improve existing operations through mechanization and digitalization and achieve “simple and smooth logistics” that are not dependent solely on workers’ experience or skills. The goal is to achieve logistics without muri (unreasonableness), mura (inconsistency), or muda (waste).
- Going forward, MLIT will pursue (1) initiatives to improve the efficiency of delivery operations through drone logistics, and (2) digitalization of port logistics, etc.

#### [(2) Development of future measures]

##### (1) Initiatives to improve the efficiency of delivery operations through drone logistics



Source: Cabinet Secretariat

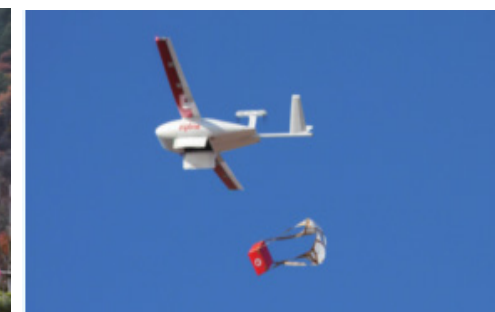
- In March 2023, MLIT released “guidelines for the delivery of packages, etc., using drones (Ver. 4.0)”. In addition to Level 3 flights, which had been addressed previously, the new guidelines also deal with Level 4 flights and outline specific procedures for the introduction of drone logistics services and delivery methods.
- In the future, the use of drones will gradually expand to more densely populated areas, and more drones will be able to fly simultaneously. Thus, MLIT will promote the social implementation of drone logistics as a sustainable business.

##### [Example of the use of drone logistics] (Column: Drone logistics in disadvantaged locations)



Drones delivering food and daily necessities

Source: Ina City



Drones delivering daily necessities, food, medicine, etc.

Source: Zipline International Inc.

##### (2) Initiatives to digitalize port logistics.

- MLIT established Cyber Port, which began operations in April 2021. Cyber Port is a platform designed to improve the overall productivity of port logistics by digitalizing port logistics procedures among private companies and streamlining their operations. MLIT is promoting the use of Cyber Port.



### 5. Measures for digitalization in the field of infrastructure (1)

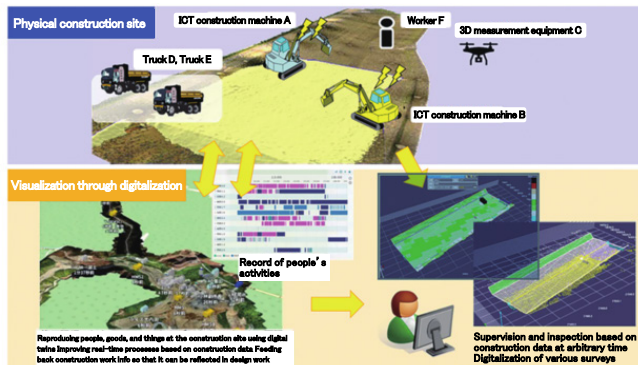
- It is important to develop measures to meet social needs and demands in a flexible manner without being bound by “conventional wisdom”.
- MLIT, which develops social capital by developing and managing land, sea, and air infrastructure, will protect the safety and security of citizens and provide advanced and convenient administrative services. To this end, MLIT will promote the digitalization of the infrastructure field through cooperation and collaboration with relevant parties.

#### [(1) Current status and future direction]

- In particular, the worker is aging in the construction industry, and many elderly workers are expected to leave the industry in the near future. Thus, the industry must enhance its appeal, encourage young people to enter the industry, and strengthen other initiatives to secure workers. It must also make efforts to solve problems through digitalization.
- MLIT, which has formulated an “action plan for DX in the infrastructure field”, is implementing various related initiatives. MLIT positions “DX in the infrastructure field” as an ‘effort to use digital technology to transform “conventional wisdom” by making infrastructure related tasks smart’. MLIT will make various related procedures easily accessible anytime, anywhere, so that infrastructure can be managed from a remote location.
- Going forward, MLIT will work on (1) initiatives to improve productivity at construction sites and (2) the promotion of xROAD, a digital transformation platform for road systems.

#### [(2) Development of future measures]

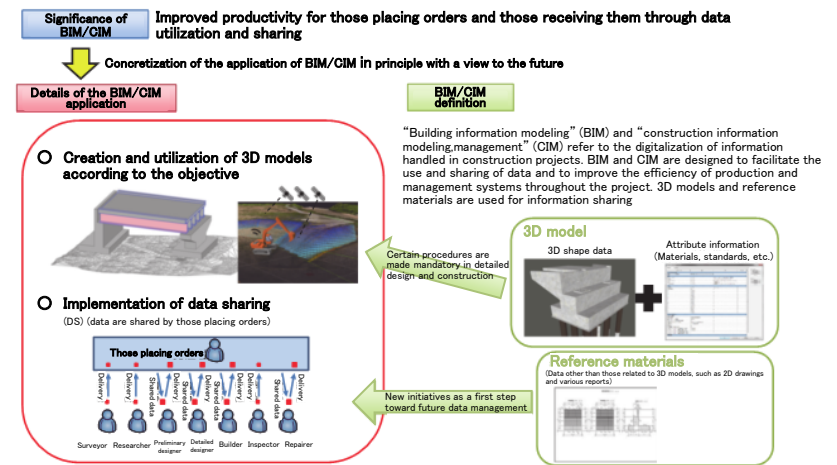
##### (1) Efforts to improve productivity at construction sites (i-Construction [ICT construction])



Source) MLIT

- It is essential to improve productivity in the construction industry. Since FY2016, MLIT has been promoting “i-Construction”, which facilitates the use of ICT at construction sites, so that an increase in productivity will outpace a decline in workers.
- Going forward, MLIT will also make full use of latest digital technologies such as digital twins to achieve ICT construction Stage II and further improve productivity. At this stage, ICT will not only improve the efficiency of individual tasks, but also the efficiency of the entire project.

##### (BIM/CIM)



Source) MLIT

- In FY2023, MLIT in principle applied BIM/CIM to all civil engineering and construction projects under its direct supervision (excluding small-scale projects). Focusing on the effects of visualization, MLIT has designated contents that can be handled by inexperienced workers as “required items” and advanced contents as “recommended items”. MLIT aims to use BIM/CIM efficiently according to the level of difficulty of each task.

### 5. Measures for digitalization in the field of infrastructure (2)

#### [(2) Development of future measures]

#### (2) Promotion of “xROAD”, a digital transformation platform for road systems

- ❑ Establishment of a new road traffic survey system
- ❑ Advanced and efficient road maintenance and management
- ❑ Advanced government procedures
- ❑ Improvement of the convenience of highways
- ❑ Promotion of next-generation ITS
- ❑ Utilization and public sharing of data

#### <Advanced and efficient road maintenance and management>

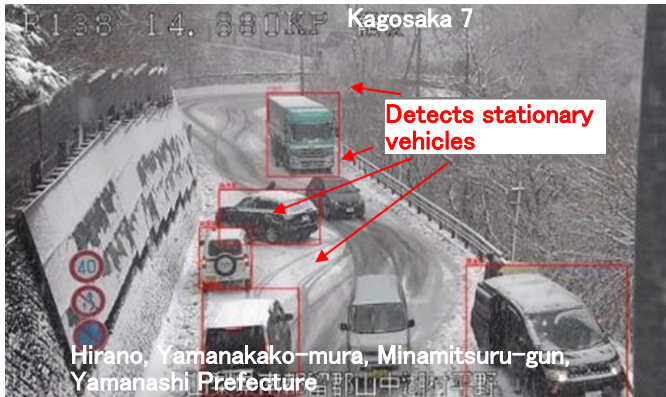


Image of automatic detection of traffic obstacles using AI

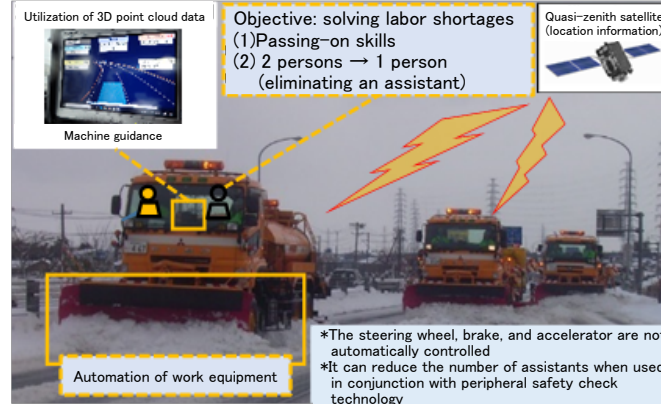


Image of automation of snow removal operations

Source) MLIT

- In the field of roads, MLIT is promoting “xROAD”, which refers to various digital transformation initiatives, such as road surveys and planning, construction, maintenance, and improvement of user convenience. The purpose is to improve the quality of road services, people’s lives, and the productivity of economic activities.
- MLIT, in addition to making the tasks of road administrators more advanced, aims to ensure safety, security, and convenience for road users. MLIT will seek to create roads that are “safe, smart, and sustainable” by incorporating the opinions of road users and workers in the field, as well as technologies and various insights from the private company.

#### <Example of utilization and public sharing of data>

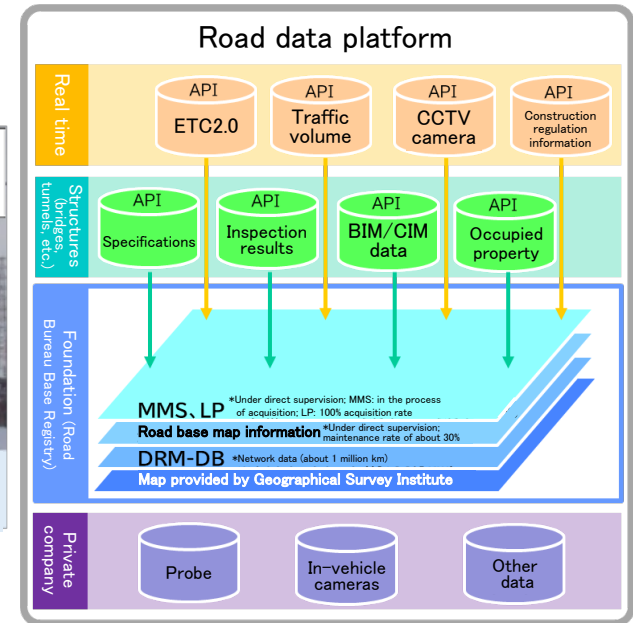


Image of building a data platform

### 6. Cross-cutting initiatives to support digitalization

- MLIT is pursuing the digitalization of its administration, and is undertaking cross-cutting initiatives to comprehensively and effectively promote various policies in its fields.
- MLIT will pursue “land, infrastructure transport and tourism DX” to respond to various issues related to the MLIT administration through project reforms and operational improvements by taking advantage of the rapid progress of digital technology.

#### [(1) Current status and future direction]

- MLIT has been pursuing efforts to digitalize government procedures and to make various information available to the public. It is now strengthening its initiatives to enhance remote and non-contact procedures in response to the COVID-19 pandemic.
- In principle, MLIT will require that paperwork based on laws and regulations be submitted by online. MLIT will improve the convenience for users of its administrative services, and pursue simple and efficient administrative operations.
- Going forward, MLIT will work on (1) the formulation of a new National Spatial Strategy (National plan), (2) the digitalization of government procedures in the fields of MLIT, (3) the development of a data platform, and (4) various initiatives to support the formation of a digital society.

#### [(2) Development of future measures]

##### (2) Initiatives to digitalize government procedures in the fields of MLIT

(Column: Electronic motor vehicle inspection certificate [Digitalization of government procedure])



Electronic motor vehicle inspection certificate

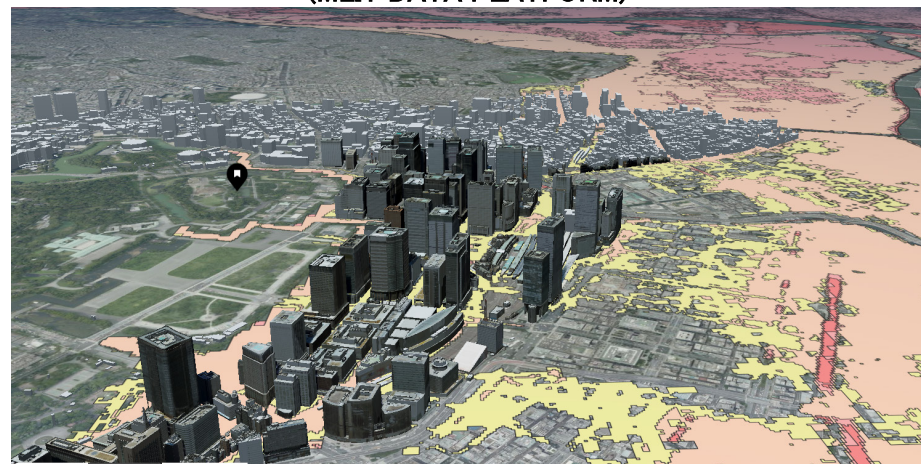
Source) MLIT



Online application of vehicle registration procedure

- In conjunction with the introduction of electronic motor vehicle inspection certificates, MLIT has begun to outsource recordkeeping and other clerical services related to inspection certificates to third parties that meet certain requirements. Under the new system, users no longer need to visit the Transport Branch Office to receive a motor vehicle inspection certificate by applying for a “one-stop service” (OSS) when there are no changes in the information on the electronic motor vehicle inspection certificate (e.g., renewal inspection). Thus, the new system is expected to improve the convenience of users who use OSS and promote administrative efficiency.

#### (3) Initiatives to develop a data platform (MLIT DATA PLATFORM)



Source) MLIT

□ Superimposed display of a 3D city model and inundation forecast data around Tokyo Station (MLIT DATA PLATFORM)

- MLIT is building “MLIT DATA PLATFORM”, which links data on land, economic activities, and natural phenomena to enable data search and retrieval across various fields.

# Chapter 2 Toward the realization of good lives and society

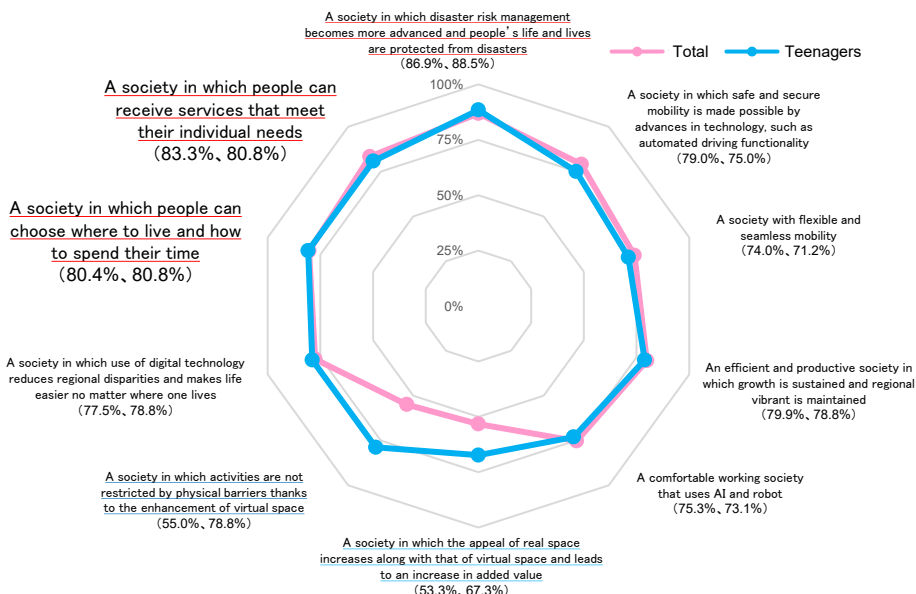
## Section 2 Vision for new lives and society 1. Changes in lives and society through digitalization

### 1. Changes in lives and society through digitalization (1)

- It is important to promote digitalization in the fields of MLIT and enable people to receive services that meet their individual needs and choose where to live and how to spend their time. It is also important to ensure “sustainable, vibrant, and good lives and society”. This section presents the results of the “Public Opinion Survey”, examines how digitalization changes lives and society, and discusses what the future may hold in this regard.
- Regarding the lives and society desired for the future, it is important to make efforts to create a better society that makes maximum use of digital technology. Efforts should be made to accelerate disaster risk management and other safety and security initiatives for which people’s expectations are high across all age groups. Efforts should also be made to accelerate the creation of a society in which people can choose services that meet their individual needs, where they live, and how they spend their time. In addition, an attempt should be made to utilize virtual space, for which young people who play important roles in the next generation have high expectations.

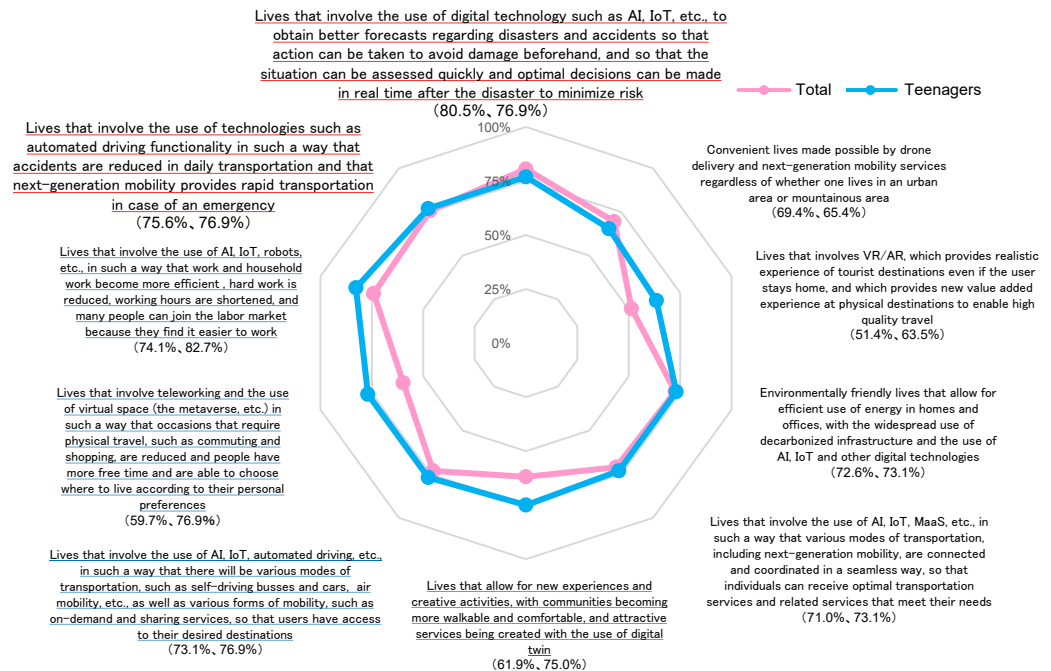
#### [Public Opinion Survey]

##### [Vision of a new society to be realized in 2050 through digitalization]



#### [(1) Attitudes toward future lives and society]

##### [Futuristic lifestyles to be realized through digitalization]



(Note) Figures in the parentheses for each option indicate the percentage of respondents who answered “desirable” (“highly desirable” and “somewhat desirable”) (total, teenagers)

Source: Public Opinion Survey released by MLIT

- At least four out of five people of all age groups expressed their desire for “a society in which people’s life and lives are protected from disasters”, “a society in which people can receive services that meet their individual needs”, and “a society in which people can choose where to live and how to spend their time”.
- With regard to items about a society that utilizes virtual space, a higher percentage of teenagers answered that such a society was desirable compared with people in other age groups.

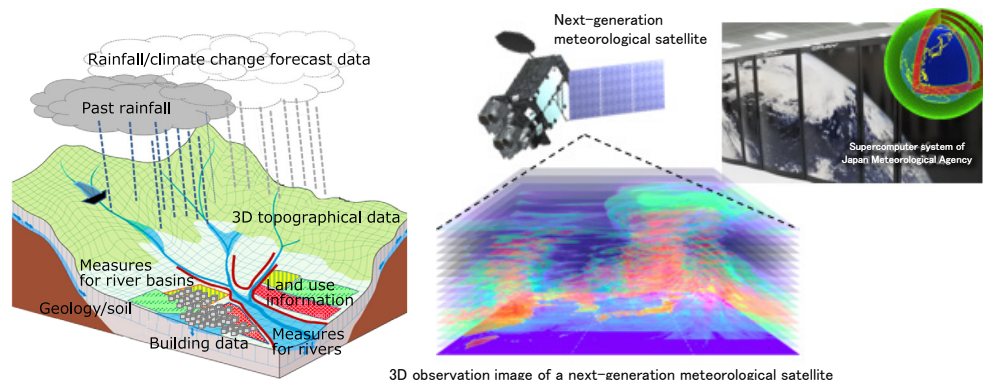
- At least three out of four of people of all age groups have high expectations for improved safety and security through digitalization.
- Among teenagers, expectations were high for new lives through digitalization, including the use of virtual space.

### 1. Changes in lives and society through digitalization (2)

[Sustainable, vibrant, and good lives and society achieved through digitalization]

- Regarding a vision for a new society that can be achieved through digitalization in 2050, at least four in five people of all age groups expressed their desire for “a society in which people’s lives and livelihoods are protected from disasters”, “a society in which people can receive services that meet their individual needs”, and “a society in which people can choose where to live and how to spend their time”, as mentioned earlier. With regard to items about a society that utilizes virtual space, a higher percentage of teenagers answered that such a society was desirable compared with people in other age groups.
- It is important to promote efforts to improve safety, security, and productivity, eliminate restrictions of, and enhance, mobility, and make daily lives and community development more advanced, so that lives and society become sustainable, vibrant, and prosperous.

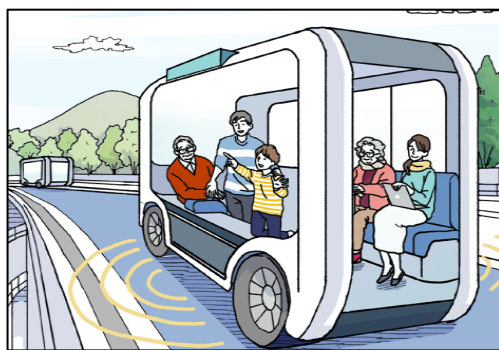
#### ○Digital disaster prevention



3D observation image of a next-generation meteorological satellite

- Estimate and visualize disaster risks and damage conditions with the use of digital twins, improve the accuracy of forecast information, and transmit and disseminate information at an early stage, thereby reducing disaster risks.

#### ○Automated driving



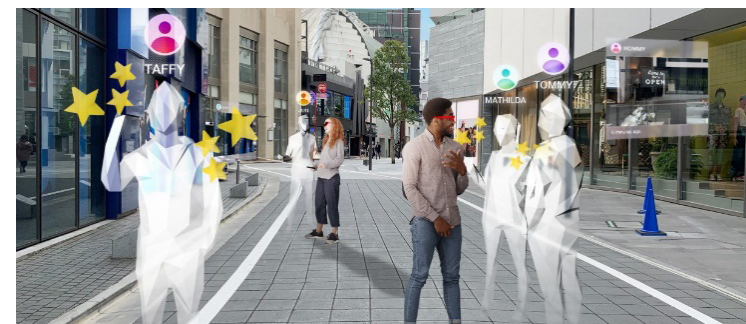
- Promote the widespread use of self-driving vehicles to reduce the risk of accidents, secure means of transportation, and eliminate worker shortages.

#### ○Automated construction equipment and drones



- Reduce the risk of accidents, improve work efficiency, and eliminate the shortage of workers by making construction sites completely unmanned.

#### ○Metaverse



- Utilize virtual spaces as metaverse to communicate remotely, activate interactions, and optimize the urban design.

### 1. Changes in lives and society through digitalization (3)

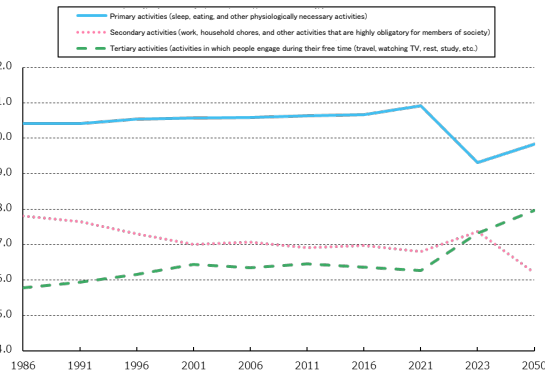
- Digitalization removes restrictions related to time and space. People may change how they use their time, and their latent needs may manifest themselves regarding the place of residence as a result of digitalization. Thus, it is conceivable that a different kind of migration could occur in society.

#### [(2) Qualitative improvement in real space with a view to liberation from restrictions related to time and space]

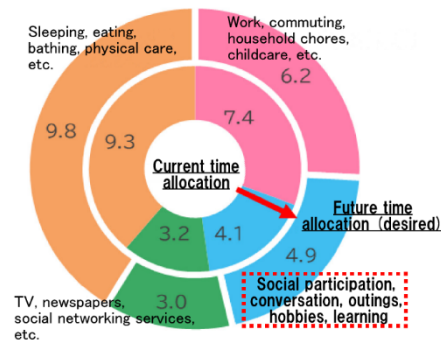
- The use of time has changed with the times. Between 1986 and 2021, there was a decline in the amount of time spent on activities such as work, commuting, and household chores that are highly obligatory for members of society (secondary activities). In contrast, there was an increase in the amount of time spent on activities during their free time (tertiary activities).
- Regarding the ideal use of time, the Public Opinion Survey showed that people were more eager to increase their tertiary activities than secondary activities. Activities that increased the most were social participation, conversation, recreation, hobbies, and learning.

#### [Ideal use of time]

<Changes in the use of time (15 years and above, entire week) and their intentions regarding future time use>



<How they currently spend their time in a day and their intentions for the future>



#### [Example of the diversification of the use of time]

(Column: Adding high value to travel time by making vehicle interiors more advanced)

- Sony Honda Mobility Inc. in January 2023 released AFEELA Prototype, an electric vehicle. The manufacturer aims to equip the vehicle with a 5G mobile communications system and Level 3 automated driving functionality that make driving operation unnecessary under certain conditions.
- Sensors inside and outside the vehicle collect and analyze information on traffic and the condition of the surrounding areas, contributing to safe and secure driving. In addition, the vehicle provides various entertainment options, such as movies, music, and games with realistic sensations, as well as services that cater to individual needs. The company aims to propose new experiential value that turns a space for mobility into a space of excitement.
- With the development of self-driving technology, etc., the automobile may change from a means of transportation that takes people to their destination, to a means of improving the value of travel time.



Sony Honda Mobility's AFEELA electric vehicle



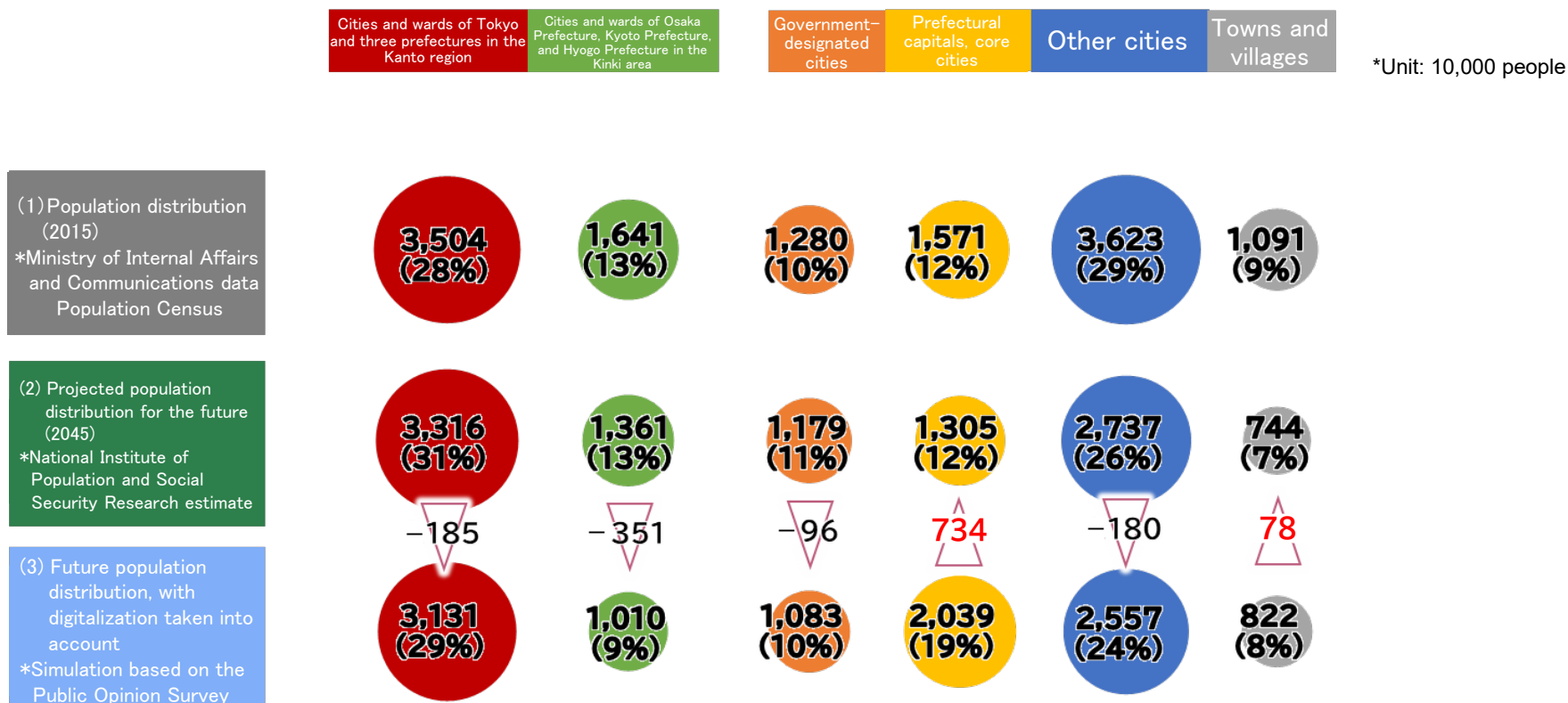
A lean interior space where experience takes center stage

### 1. Changes in lives and society through digitalization (4)

- It is conceivable that a different kind of social migration could occur if the advancement of digital technology leads to a society in which people have more choices regarding where to live and are able to achieve diverse ways of living.
- MLIT conducted a simple simulation based on Regional Population Projections for Japan released by the National Institute of Population and Social Security Research, taking account of people's desires regarding social migration indicated in the Public Opinion Survey. The results showed that there were latent needs for housing in prefectural capitals and core cities.

(Size of the city in which respondents want to live [1])

[Population distribution simulation taking account of the size of the city in which respondents would like to live if there were no restrictions in society regarding time and space]



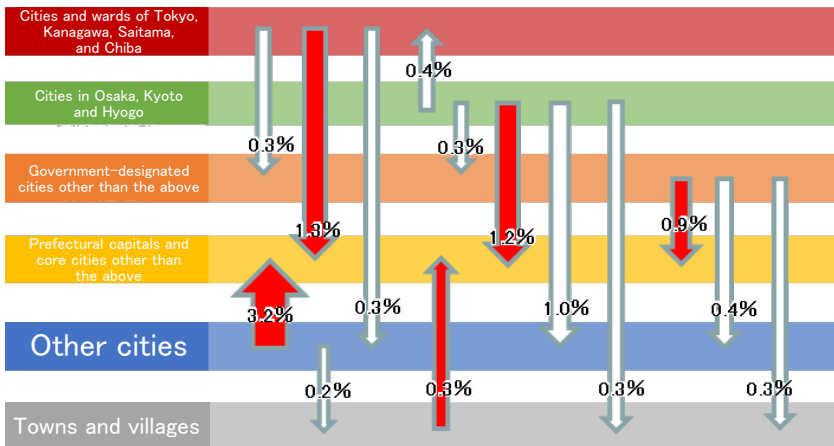
- The number of people in prefectural capitals and core cities estimated by “(3) Future population distribution that takes into digitalization” (\*Simulation based on the Public Opinion Survey) is 20.39 million, 7.34 million more than the 13.05 million estimated by “(2) Projected population distribution for the future” (\*National Institute of Population and Social Security Research estimate).

### 1. Changes in lives and society through digitalization (5)

- The results indicate that there is a certain number of people in urban areas of the Kanto and Kinki regions (in addition to those in other cities or in towns and villages) who would desire to live in prefectural capitals or core cities if digitalization leads to more choices as to where they can live.
- This suggests that the convenience of daily living and affordability of living are regarded as important in selecting a place to live in the future, when digitalization advances.
- The cost of living is lower in regional areas, which have an advantage over the three metropolitan areas in this regard.

(Size of the city in which respondents want to live [2])

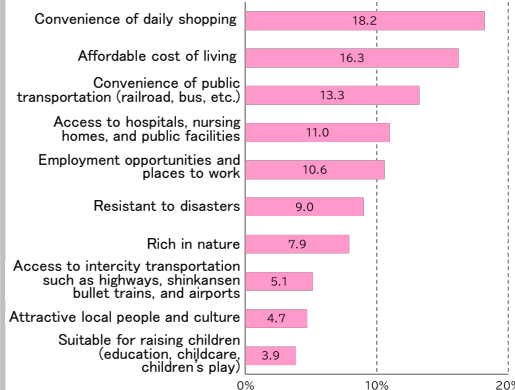
[Inflow and outflow to and from the places of residence that respondents would prefer if there were no restrictions in society related to time and space (data are aggregated for each area where respondents current live)]



Source: Simulation based on Regional Population Projections for Japan released by the National Institute of Population and Social Security Research and the Public Opinion Survey released by MLIT

(What respondents expect from the future place of residence)

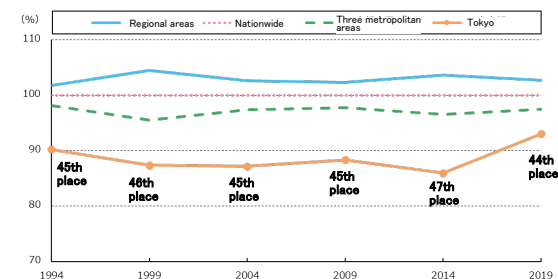
[What respondents emphasize in selecting a future place of residence]



Source: Public Opinion Survey released by MLIT

- A high percentage of respondents answered that they would focus on the convenience of daily shopping, affordability of living, convenience of public transportation, and availability of hospitals, nursing-care facilities, and public facilities.

[Index of surplus after basic spending is subtracted from disposable income (national average = 100)]



Source: Created by MLIT based on the National Survey of Family Income, Consumption and Wealth (formerly the National Survey of Family Income and Expenditure) released by the Ministry of Internal Affairs and Communications

- Regarding the affordability of living, regional areas have an economic advantage when it comes to the surplus left over after basic spending is subtracted from disposable income.



### 1. Changes in lives and society through digitalization (6)

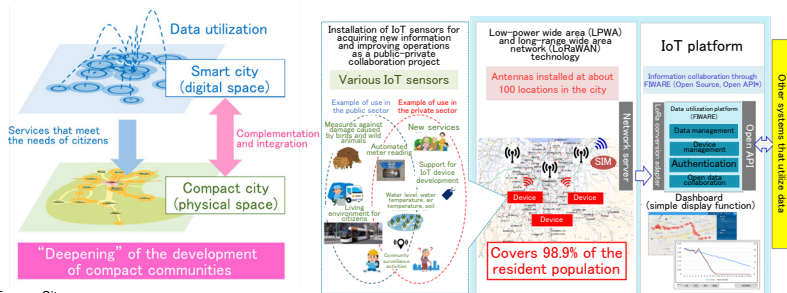
- Digitization removes restrictions related to time and space. It has the power to drastically increase the potential for solving the challenges facing regional areas and facilitate data collection and the sharing of ideas and methods. In order to respond quickly to changes in the public and policy needs, it is necessary to collect and utilize data effectively and make lives easier through digitization.
- In regional areas with a declining population, it is expected that digital technology will be utilized to maintain and improve the quality of life in real space, in addition to improving the efficiency of life services. For example, digital technology will increase the feasibility of life services that could not be provided in the past because of restrictions related to space and time.
- In order to create a sustainable and vibrant regional community, it is important that the community take the initiative in drawing up a vision and pursuing regional revitalization efforts based on that vision.

#### (Developing a compact and livable community)

- It is necessary to further promote the organic linkage between the creation of a compact community (i.e., the concentration of community functions within a certain regional space) and the restructuring of regional public transportation systems while making use of digital technology.

#### [Column: “Deepening” the compact city through digitalization]

- Against the backdrop of a declining birthrate and an aging population, Toyama City, Toyama Prefecture has developed a compact community with a concentration of facilities centered around public transportation services. This had the effect of encouraging people to live in the city center and along public transportation lines. However, suburban areas are experiencing a significant population decline and aging population. They face difficulty maintaining regional communities and improving the quality of life for residents.
- Thus, the city is seeking to create a data-driven smart city to solve such challenges. The city will acquire new data by using IoT technology and making various procedures electronic. The city also aims to improve operational efficiency through data utilization, implement evidence-based policymaking (EBPM), and create new services through public-private partnerships by using open data.

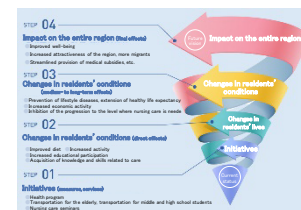


Source: Toyama City

#### (Ensuring sustainable life services)

- It is important to expand the capabilities of solving regional challenges. This could be achieved by a mechanism in which digital technology is used across a wide range of policy fields so that resources can be provided and shared among one another to tackle common issues found in various fields.

#### [Column: A sustainable community that mutually fosters life services]



#### Targeted effects of the basic infrastructure concept

Source: Mitoyo Tourism and Exchange Authority

- In Mitoyo City, Kagawa Prefecture, Kurashinokoutsuu was established in 2022 with investment from several local companies. The company operates AI on-demand transportation and provides subscription-based services.
- The company acquires and analyzes health data on elderly people who use its transportation services after turning in their driver's licenses. The company conducts demonstration projects for the utilization of data across different fields, such as a study regarding the impact of regional transportation services on health. The results will be used for policymaking.

#### (A community with unique characteristics)

- It is important to incorporate digitalization, form a community with unique characteristics, take into account that people are increasingly taking workcations and returning to the countryside, and aim for coexistence with urban areas through mutual cooperation.



Face-recognition system

Source: Shirahamakan

#### [Column: Hospitality enhancement using face-recognition technology]

- A hotel in Shirahama Town, Wakayama Prefecture has adopted a face-recognition locking system for some guestrooms.
- The hotel conducted a demonstration project in which a face-recognition payment system was introduced at restaurants, stores, and other facilities, enabling customers to dine and shop without wallets.
- The use of digital technology such as biometric authentication is expected to improve the convenience of tourists.

### 1. Changes in lives and society through digitalization (7)

- One of the characteristics of virtual space is to provide an experience in which people feel as though they were sharing the same place wherever they are physically located. For example, the metaverse is a virtual space on the internet where users operate avatars to interact with others. There are also experimental services that allow users to purchase products in virtual space. The market size is expanding for services that utilize the metaverse.
- Meanwhile, Project PLATEAU develops solutions that utilize the metaverse involving urban digital twins. This applies to various fields such as community development, regional revitalization, and tourism.
- The metaverse leads to the creation and expansion of new markets, providing opportunities for new services. On the other hand, the metaverse removes restrictions related to time and space, creating value in virtual space and enabling people to achieve their objectives without traveling. This means that the value of real space and mobility may have to be redefined. For this reason, it is necessary to understand the characteristics of real space and mobility.

#### [(3) Expansion in the use of virtual space through the enhancement of digital infrastructure]

##### (1) Changes in attitudes toward virtual space

###### [Intention to use virtual space]

Check digital virtual space (the metaverse, etc.) for everyday items such as food and clothing, and purchase them online (58.5%, 67.3%)

Experience places that are normally difficult to visit, such as remote areas and areas where the environment is harsh, in digital virtual space (the metaverse, etc.) (55.4%, 65.4%)

Enjoy entertainment such as museums, events, festivals, concerts, etc., in digital virtual space (the metaverse, etc.) (49.7%, 55.7%)

Use an avatar (a representation of the user) for face-to-face communications at work, such as business talks and business trips (41.0%, 65.3%)

Operate in digital virtual space (the metaverse, etc.) and let robots and others handle physical work, household chores, etc. (48.4%, 65.3%)

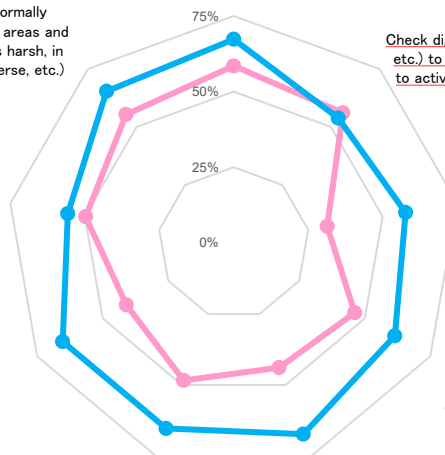
Go to work in digital virtual space (the metaverse, etc.) through an avatar (a representation of the user) without physically going to the office (43.9%, 67.3%)

— Total — Teenagers

Check digital virtual space (the metaverse, etc.) to examine a space directly related to activities involving my home, such as moving or house tours (56.1%, 53.8%)

Interact in digital virtual space (the metaverse, etc.) even on occasions for which the purpose is to interact with others, such as social gatherings and dating (31.4%, 57.7%)

Experience VR tourism in digital virtual space (the metaverse, etc.), which lets users experience a tourist destination (46.2%, 61.5%)



(Note) Figures in the parentheses for each option indicate the percentage of respondents who answered "want to use" ("want to use very much" and "what to use somewhat") (total, teenagers).

Source: Public Opinion Survey released by MLIT

- A majority of people in all age groups answered that they would like to check digital virtual space for everyday items and purchase them online, and that they would also like to check digital virtual space to examine a space directly related to activities involving their home, such as moving or house tours. About 30% of the respondents answered that they would like to use virtual space for human interactions, such as social gatherings and dating.
- By age group, at least half of the teenagers answered that they would like to use virtual space for all items listed. Compared with people in other age groups, their expectations are relatively high for the use of virtual space in various situations such as commuting, business trips, household chores, and sightseeing.

##### [Example of the metaverse]



α U live



α U place

- Experience a tour of Shibuya using an avatar. (α U metaverse)
- Realistic live experience using 360-degree, free-viewpoint video. (α U live)
- Shopping experience made possible by a store space and product displays that are highly reproducible. Receive customer service from staff at physical stores. (α U place)

Source: KDDI Corporation

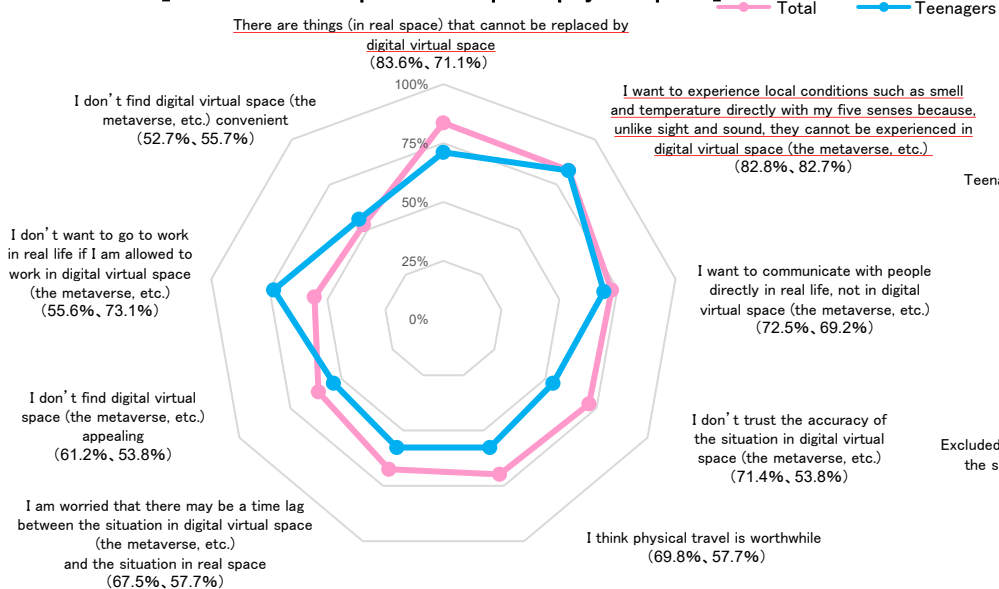
### 1. Changes in lives and society through digitalization (8)

- In the future, activities that had to be handled in real space will no longer require travel if handled in digital virtual space. In this regard, many people recognize the value of real space that cannot be replaced by virtual space.
- The enhancement of virtual space allows for activities that are not hampered by physical restrictions. Examples include working and shopping from home. It is also possible that there will be fewer occasions that may force people to travel. On the other hand, it is likely that people will still value real space. They may seek to have physical interactions with others and experience the local scene with their five senses. Therefore, demand for travel is expected to remain as people visit physical locations.
- The use of virtual space will not only improve efficiency by reducing travel time, but also enable people to experience tourist destinations and commercial facilities that they would not otherwise be able to visit because of physical restrictions. At the same time, travel demand and consumption demand may be stimulated in such a way that more people will interact with one another in real space. Thus, the use of virtual space is expected to have various positive effects.
- Virtual space will also make it possible for people to communicate with those with whom they could not otherwise collaborate because of physical restrictions. Thus, it is likely that it may lead to the development of creative products and services.

#### [(3) Expansion in the use of virtual space through the enhancement of digital infrastructure] (2)

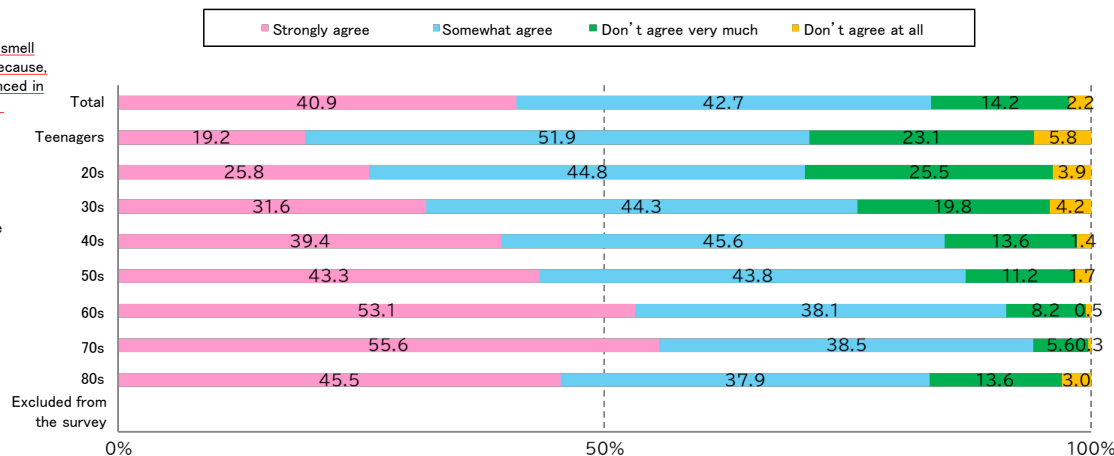
##### (1) Changes in attitudes toward virtual space

##### [Whether virtual space can replace physical place]



(Note) Figures in the parentheses for each option indicate the percentage of respondents who answered "agree" ("strongly agree" and "somewhat agree") (total, teenagers).  
Source: Public Opinion Survey released by MLIT

##### [There are things (in real space) that cannot be replaced by digital virtual space (the metaverse, etc.)]



□ **In the future, activities that had to be handled in real space will no longer require travel if handled in digital virtual space. In this regard, at least four in five people of all age groups responded that "there are things (in real space) that cannot be replaced by digital virtual space" and that they "want to experience (the local scene) with my own five senses".**

□ By age group, about 90% of respondents in their 60s and 70s agreed with the statement "There are things (in real space) that cannot be replaced by digital virtual space". The figure was about 70% among those in their teens and 20s, indicating that younger people were more likely to believe that virtual space could replace real space. Even so, many people recognize the value of real space that cannot be replaced by virtual space.

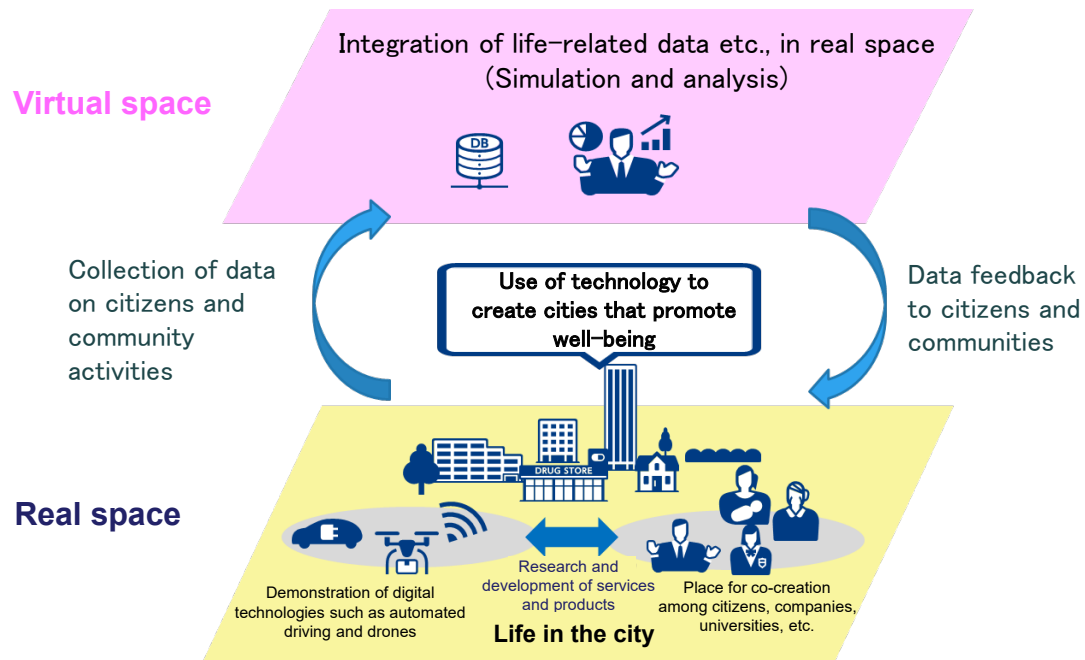
## 1. Changes in lives and society through digitalization (9)

- Digitization enables the creation of new values based on a high degree of integration between virtual space and real space. The interaction between virtual space and real space may create new services and lead to a more comfortable society.
- It is important to create an environment that will make people's activities and experiences more advanced and diversified. This could be achieved through the development and implementation of a new human interface that serves as a point of contact between digital virtual space and people, and through the creation and utilization of urban digital twins. Practical communication tools are expected to be developed and utilized to connect residents with those engaging in local development projects, such as the government and real estate developers.
- Efforts are underway to utilize virtual space, including the current initiative to promote open innovation using 3D city models.

### [(3) Expansion in the use of virtual space through the enhancement of digital infrastructure] (3)

#### (2) Efforts currently underway to utilize virtual space

[Digital twins support people's activities as they become more diversified and advanced]



- Initiatives do not have to be limited to conducting simulations and analysis in virtual space and feeding back the results to real space. A collaboration could be formed with "living labs", which use real space as a testing ground for new technologies to research and develop services and products. Under such an initiative, 3D city models will be used for demonstration experiment of digital technologies such as automated driving and drones in real space. Technology will be improved through the participation of citizens, and data obtained in real space will again be fed back to virtual space.
- Digital twins could support people's activities as they become more diversified and advanced. Virtual space and real space could interact with each other and lead to the urban design that promote well-being with the use of technology (living labs that incorporate digital twins).

Living lab incorporating digital-twin technology

### 1. Changes in lives and society through digitalization (10)

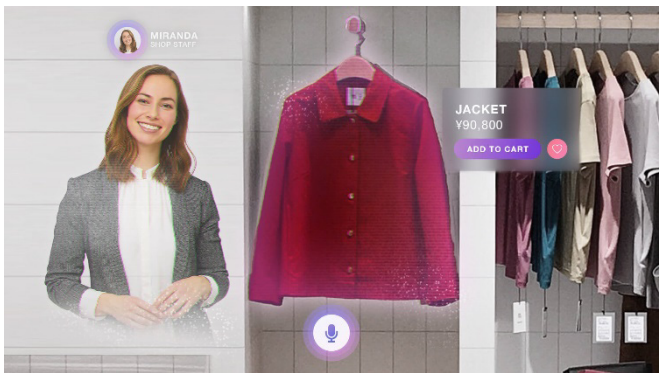
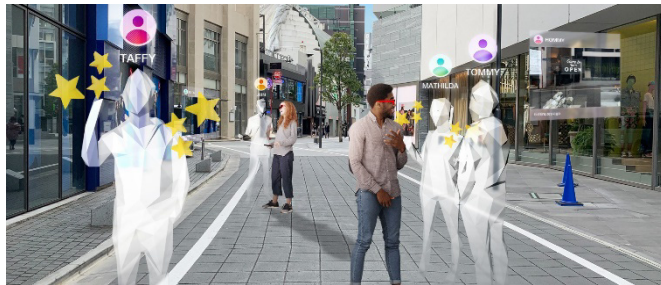
[(3) Expansion in the use of virtual space through the enhancement of digital infrastructure]

(2) Efforts currently underway to utilize virtual space

#### Digital twin example (1)

[Column: Use of AR/VR for cyber-physical cross-cutting communication]

- MLIT, with the use of a 3D city model (PLATEAU) through a public-private partnership, built a platform that allows local augmented-reality users and remote virtual-reality users to communicate with each other as if they were sharing the same space. In this way, MLIT examined the creation of new communications values. MLIT will establish a mechanism to reconnect people with one another. Such a mechanism, which allows users to experience community strolls, may also have industrial applications. For example, it could be used for tourism, events, and commerce.



Source) MLIT

#### Digital twin example (2)

[Column: Immersive urban planning using XR technology]

- The workshop were held in Yokohama City using tangible interface technology. Under this technology, which uses a 3D city model (PLATEAU), the model in virtual space changes correspondingly when the model in front of the user is rearranged or replaced. The tool help citizens to join the urban development easiliy.
- Various ideas of participants can be visualized because discussion are immediately reflected as image of the city in virtual space.



Rearranging model buildings



Placing pieces on the board

- Users experience and study the city in a dynamic way by rearranging or removing the model buildings
- Users place various pieces on the board and study the scene in detail

Source) MLIT



Reviewing the scene on a monitor/screen  
•Group discussion by sharing the envisioned scene

#### Realistic experience with VR goggles

- After the group discussion, users put on VR goggles and enter the space for a realistic experience



## 2. New lives and society (1) New lifestyles

- This section discusses the prospect for new lives and society as digitalization accelerates and contributes to solving Japan's social problems. The focus is on the aspects that will enrich our lives and society, as well as people-friendly digitalization that provides services to meet the needs of each individual.
- Regarding new lifestyles, the use of digital technology offers unprecedented options in various aspects of our lives, such as how to work, how to spend leisure time, and how to deal with digitalization.

### (How to work)

- The use of AI, IoT, robots, etc., will make work and household chores more efficient, reduce long work hours, etc., and eliminate worker shortages.
- Remote work, automation, etc., will lead to increased flexibility regarding when to work and where to work, allowing individuals to enjoy work according to their lifestyles.

### [Column: A new way of working (robot operator)]

- Professional workers who remotely operate heavy machinery and robots in the field and develop and maintain infrastructure.
- The work requires advanced skills related to machinery and system operations. These professional workers freely manipulate robots, and the quality of their work is comparable to that of workers with years of experience.
- They can work in a wide range of fields, including building construction and the maintenance of infrastructure such as railroads and roads, by operating a variety of robots.

### (How to spend leisure time)

- Realistic experiences of remote places, such as travel destinations, will become available at home. In real space, as well, people will have a new type of experience during their leisure time. All this will make leisure time more appealing.

### [Column: A new type of leisure (digital detox)]

- Technology that recognizes a person's face or other body parts will eliminate the need to carry a wallet or a digital device such as a smartphone. People will be able to walk around town empty-handed and dine at restaurants, ride buses, and purchase souvenirs. They will also be able to check in at airports and hotels without any ID. They can refresh their mind and body by abstaining from digital devices and staying "offline".

### (How to use space)

- Digitalization frees people from restrictions related to time and space, allowing them to use space more flexibly.

### [Column: New space for mobility (automated driving)]

- For business people, it serves as a conference room for remote meetings.
- For tourists, it is a bedroom/restaurant where they can sleep or eat comfortably while traveling.
- For children, it is a room where they study or play.

## 2. New lives and society (2) New form of infrastructure maintenance and logistics, digital twins

- Digitalization will change infrastructure maintenance and logistics, and change the nature of industry. Digitalization will also enable new services and experiences through the use of digital twins, 3D models, etc. Innovative initiatives that never existed before will improve people's well-being.

### (Evolving infrastructure maintenance and logistics)

- The use of AI, IoT, drones, robots, etc., allows for more efficient maintenance and management of infrastructure and goods. Infrastructure is kept in good condition because the timing of repairs can be determined appropriately with the use of AI, etc.
- Automation of delivery planning, logistics operations, etc., optimizes the entire supply chain and leads to an improvement in competitiveness.

### [Column: New way to manage (autonomization)]

- In the past, inspection and management work had to be performed frequently to check the condition of infrastructure as it deteriorates over time. In the future, infrastructure will be managed with a high degree of precision through technologies such as AI and drones. Infrastructure will send repair notifications at an appropriate time.
- When transporting goods nearby, the user specifies the destination, and next-generation mobility provides efficient assistance. Last one-mile transportation will become more efficient.

### (Use of digital twins to develop communities that prevent disasters)

- There will be more opportunities to go back and forth between virtual space and real space. Utilization in a wide range of fields, such as disaster prevention and community development, will expand as diverse entities engage in open innovation.
- Advances in technologies related to virtual space, including the metaverse, will allow people to freely spend more time in a location that they prefer. They will also be able to interact with various places and people.

### [Column: Realising Urban Digital Transformation (digital twins)]

- It will become easier to conduct detailed analysis regarding the kind of measures that may attract people and have them explore the area, and the kind of facilities that may influence the flow of people in the surrounding area and how they may do so.
- Forecasting the flow of people will make it easier for everyone to understand what kind of measures and facilities are needed for the community. For this reason, it will become easier for people in the community to participate in the process of urban development.

### [Column: New form of disaster prevention (digital disaster prevention)]

- Use of digital twins to simulate hazards such as floods, tsunamis, earthquakes, and fires.
- Simulation of the human flow and evacuation routes at the time of a disaster enables highly accurate predictions of the disaster condition.
- Visualization of damage can promote the development of public infrastructure to prevent disasters, the control of the operation of transportation systems, and the strengthening of the business continuity plans for companies, etc.

○The potential to create innovation in the construction industry through “Construction tech”  
(Hiroto Sato, COO/CFO, Obayashi SVVL, Inc.)

- ◆ Changes in the environment surrounding the construction industry and the sense of crisis over the delay in digitalization
- ◆ Disclosing the challenges facing construction sites
- ◆ Method to create innovation in Silicon Valley
- ◆ Standardization is the challenge
- ◆ Digitalization of the construction process to restore the unique appeal of the construction industry



○International trends in digitalization and Japan’s position  
(Makiko Eda, Chief Representative Officer, Japan, World Economic Forum)

- ◆ Social issues created by digital technology should be discussed in advance
- ◆ Importance of future-oriented international collaboration
- ◆ Japan must overcome organizational rigidity and utilize the power of digitalization
- ◆ Digitalization in the fields of MLIT should be approached in a systematic manner
- ◆ Lead the world in the implementation of digital technology for the benefit of society



○Prosperous future lives, creation of new services in regional areas  
(Hima Furuta, Representative Director, umari inc.)

- ◆ Must solve problems by taking on new challenges
- ◆ Creating new regional services through digital transformation
- ◆ Importance of “mutual aid”
- ◆ Toward a prosperous life in the future





○Toward smart cities that promote well-being in Japan  
(Mitsuyo Nishioka, Principal Researcher, Institute for International Socio-Economic Studies)

- ◆ Characteristics of smart cities in Japan
- ◆ Toward a sustainable smart city



○Expectations for virtual space and future digital infrastructure development  
(Asako Kimura, Professor, College of Information Science and Engineering, Ritsumeikan University)

- ◆ Users determine how to use virtual space
- ◆ Importance of recognizing the value of face-to-face interactions and the use of virtual space accordingly
- ◆ Development of digital infrastructure is vital for new services
- ◆ MLIT administration works well with mixed-reality and augmented-reality technology
- ◆ Sift through advanced technologies and use them actively



○Self-managed lives brought about by digitalization  
(Keita Nishiyama, Visiting Professor, Institute of Future Initiatives, the University of Tokyo)

- ◆ Self-managed lives brought about by digitalization
- ◆ From “separating” to “combining”
- ◆ The key is to create needs
- ◆ Must be tackled in an agile manner
- ◆ Digitalization should be viewed from a broader perspective



○Toward a human-centered social design that makes full use of automation technology  
(Takashi Oguchi, Professor, Institute of Industrial Science, the University of Tokyo/Director, Advanced Mobility Research Center)

- ◆ Must consider how to make full use of self-driving technology
- ◆ Importance of an institutional framework and players to build people’s confidence in automated driving
- ◆ No need to determine the final form of automated driving
- ◆ Must consider infrastructure as part of an effort to reclaim our human nature
- ◆ Must have determination to build a new framework

