Innovation in Japan Cloud-Edge Land scape

Digital Infrastructure and Cloud-Edge-IoT challenge

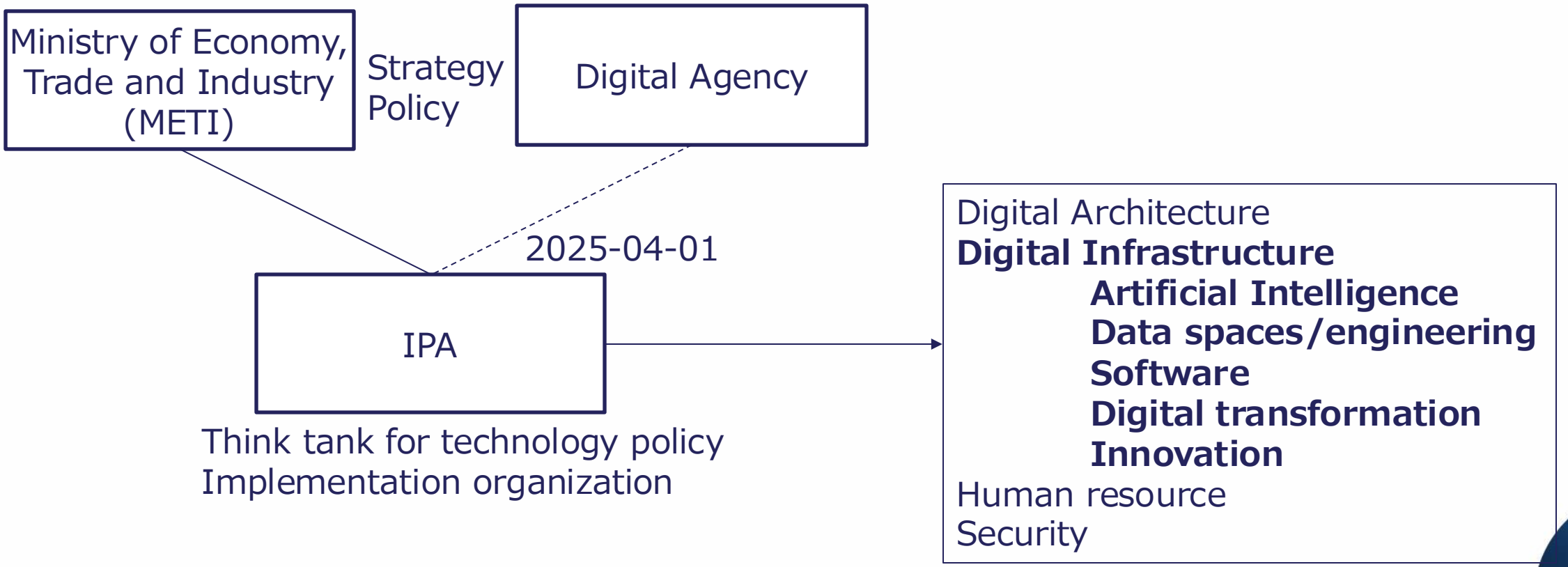
2025-03-31

Kenji Hiramoto
Digital infrastructure Center
IT Promotion Agency, Japan

IPA Better Life with IT

IT Promotion Agency

- IPA is a government-funded organization that promotes digital technology.



Kenji Hiramoto

IPA Japan

After working for an IT company, I have been working for the government for about 20 years.

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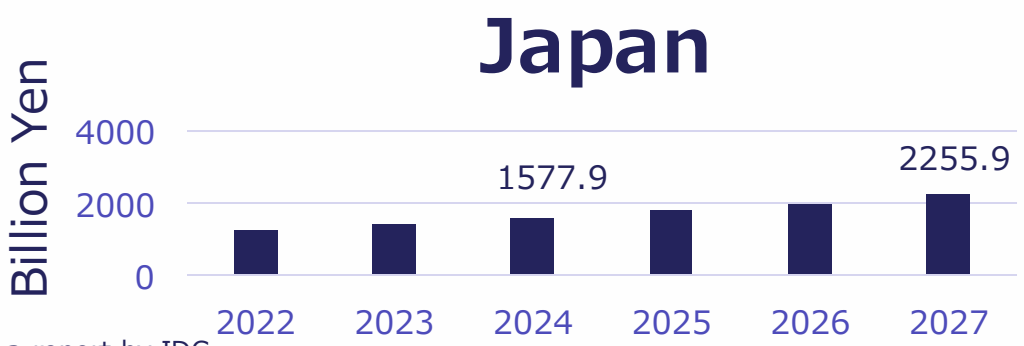
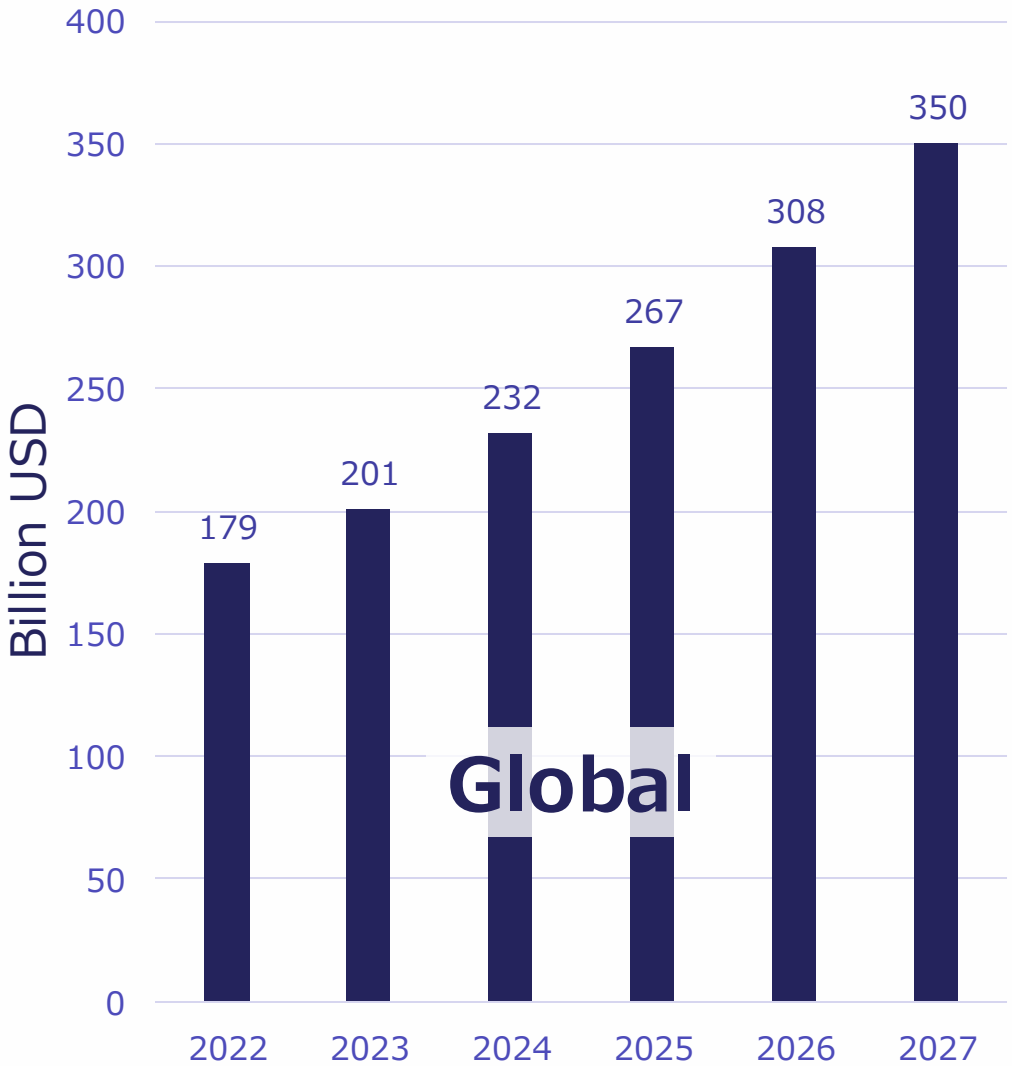
Status of
Edge computing and Digital Infrastructure

Edge computing market

- Both the Japanese and global markets are growing rapidly.
  - Service
  - Provisioned services
  - Hardware
  - Software



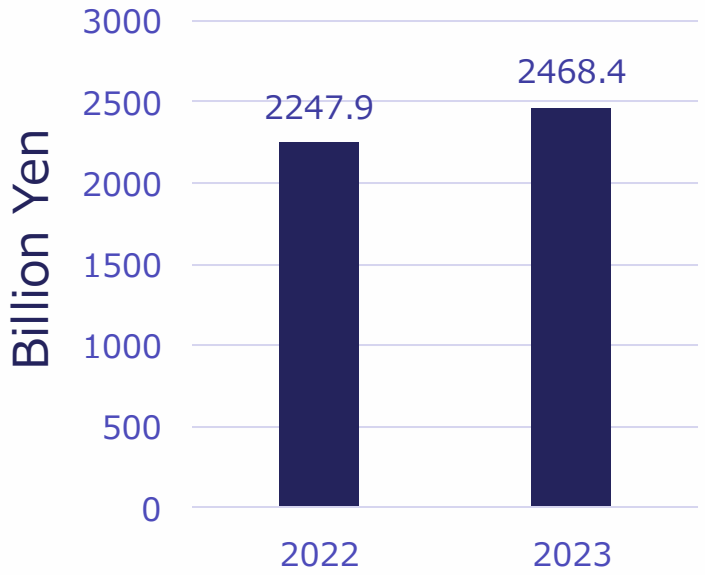


Based on a report by IDC
published in the 2024 Information and Communications White Paper by the Ministry of Internal Affairs and Communications,
converted at 150 yen to the dollar.

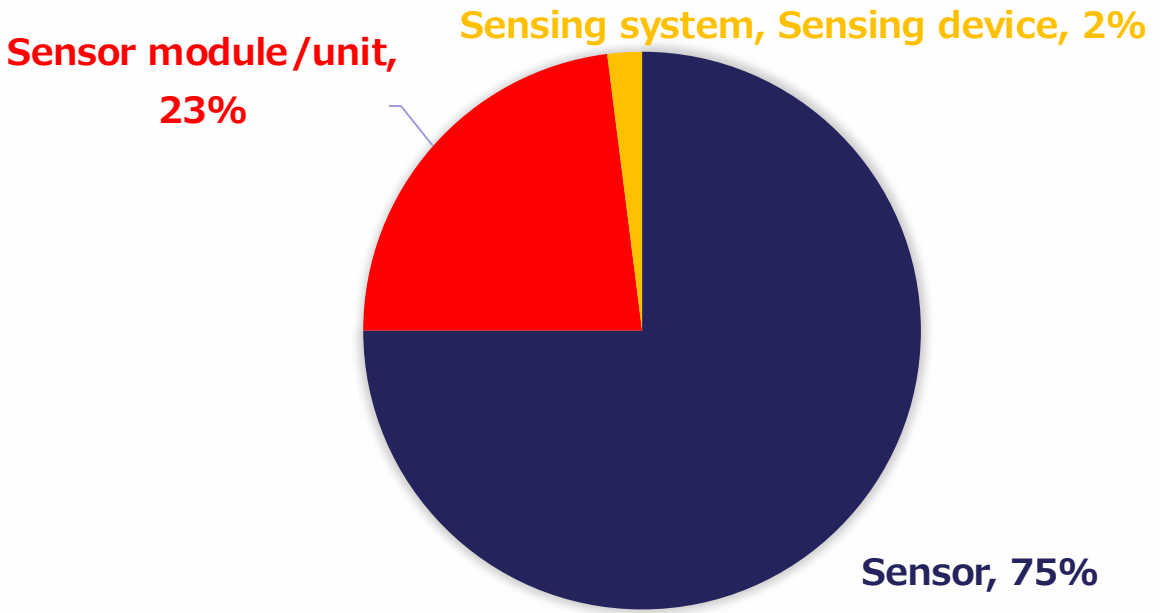
Sensor shipment

- **Sensors are doing well, but the service is not sufficient.**

Global Sensor Shipment Value



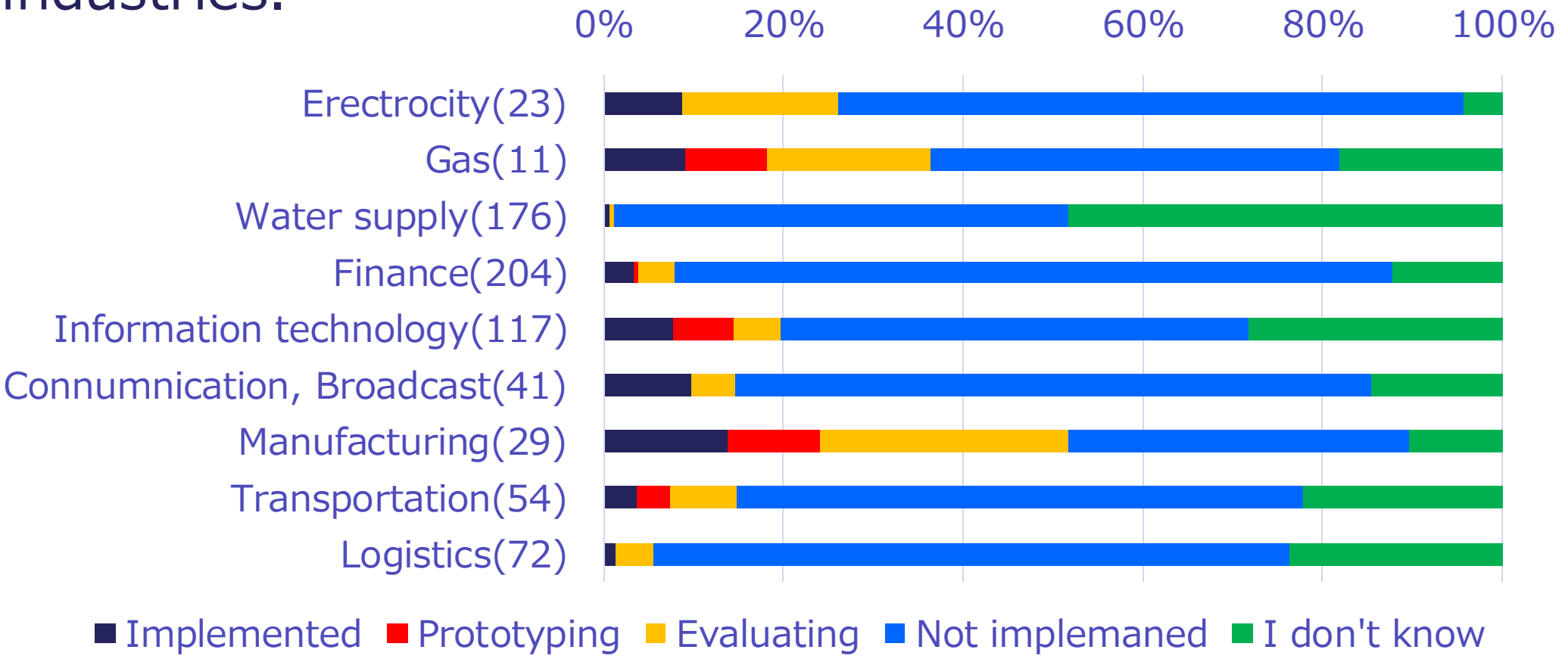
2023
Proportion of composition by shape (amount)



JEITA Sensor Global Status Survey, Sensor Global Shipment Results

Status of Edge computing

- It is being implemented in the manufacturing and energy industries.

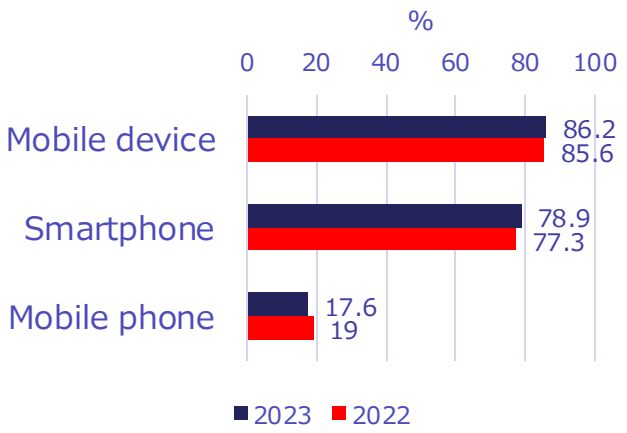


Software Trend Survey 2024, IPA
Analyzing organizations with n>10

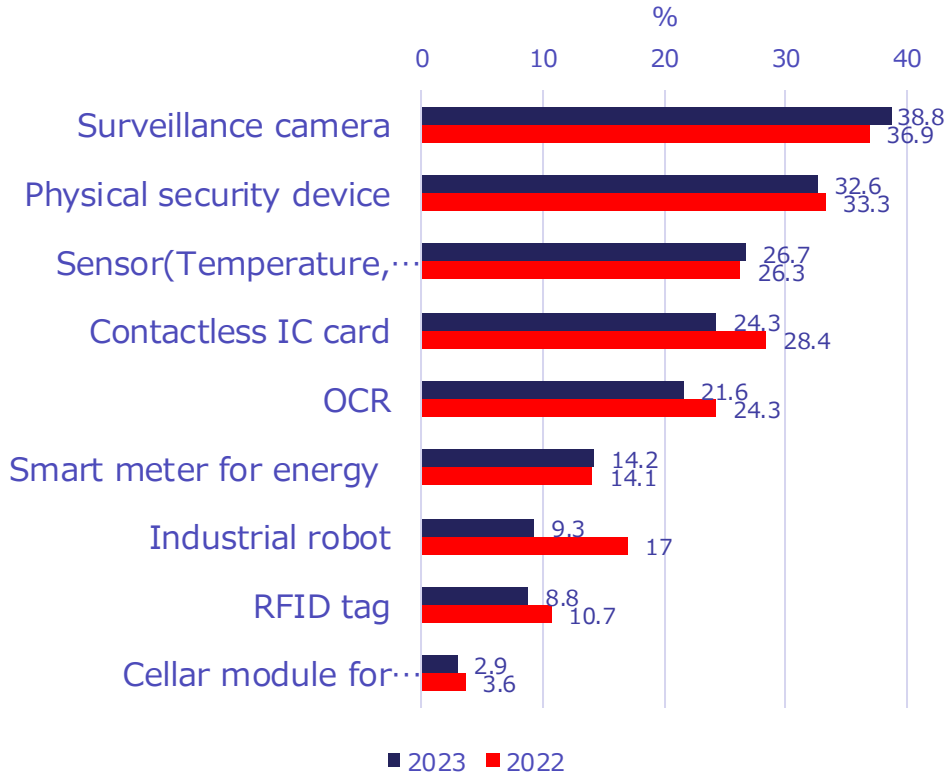
Edge Devices and Networks

- There is a lot of use related to security.
- Many services are connected by cable at facilities, etc.

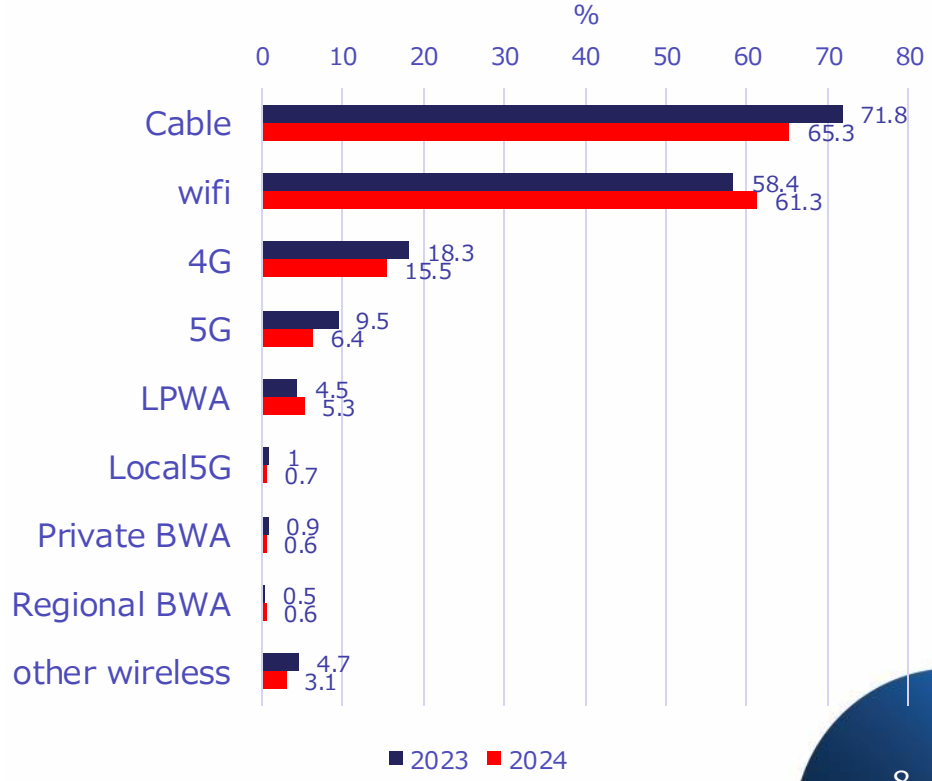
Personal device



Devices that compose IoT and AI systems and services (multiple answers)



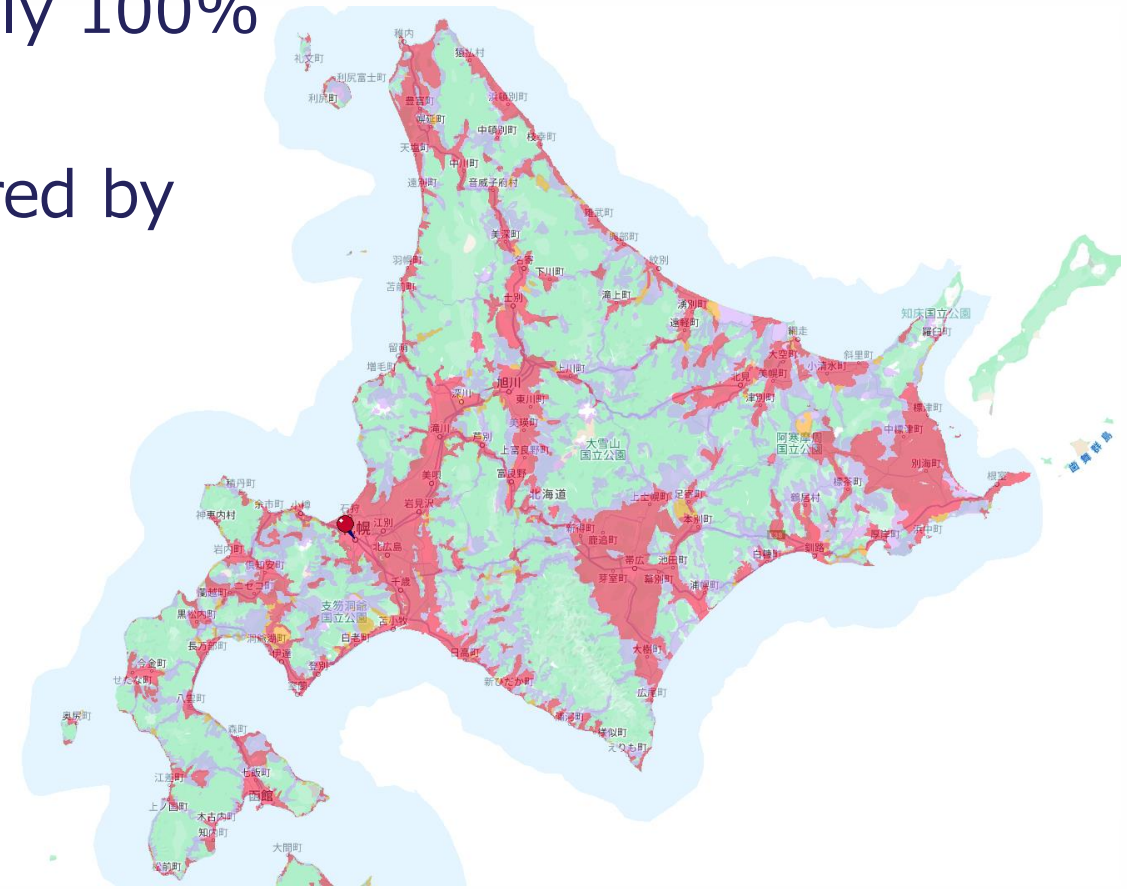
Network lines for IoT, AI, and other devices (multiple answers)



Communications Usage Trend Survey 2024, Ministry of Internal Affairs and Communications

Network

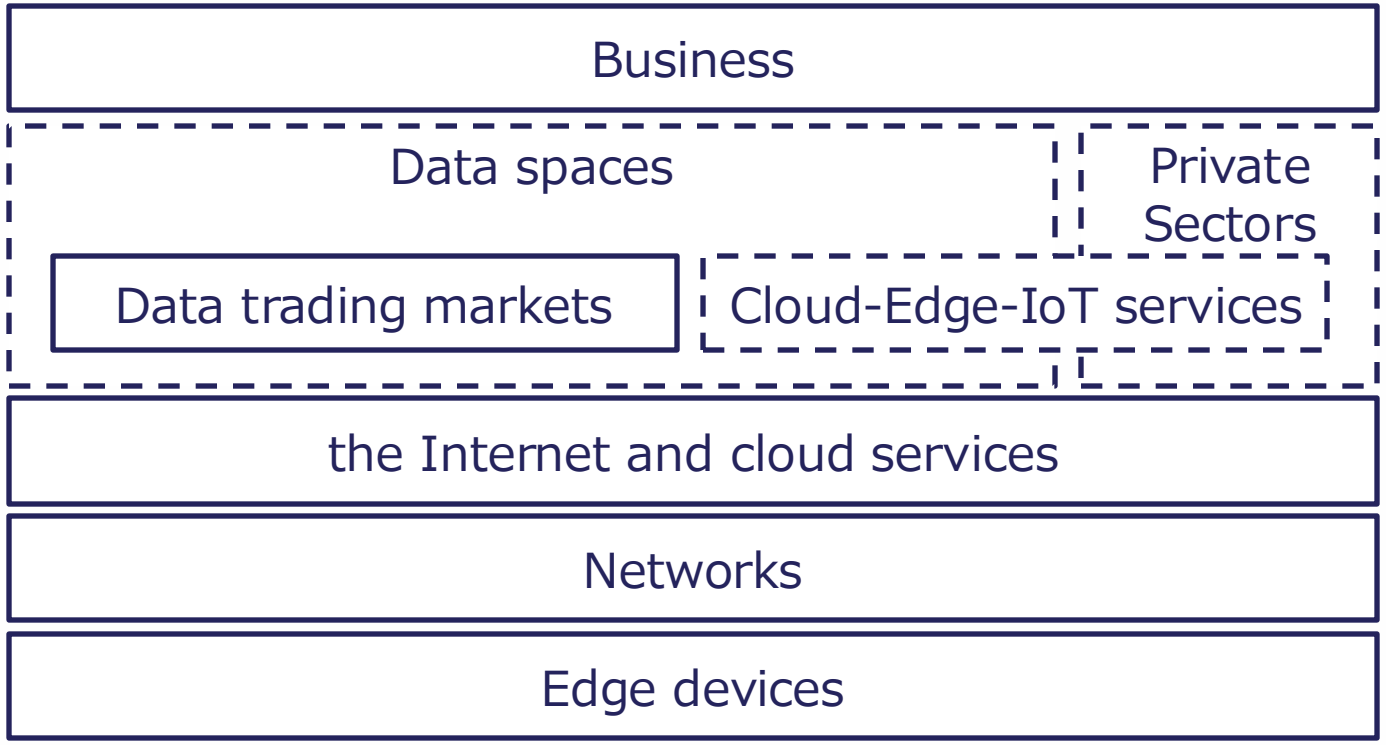
- 4G has
  a population coverage rate of approximately 100%
  and an area coverage rate of 60%.
- Areas outside the coverage area are covered by satellite communication, BWA, and LPWA.



Premium 4G　4G　4G（800MHz）

Digital Infrastructure

- Anyone can use the internet, cloud services and networks.
- Digital infrastructure is an area where the public and private sectors are working together to achieve our goals.



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Our Challenges

Importance of Cloud-Edge Tech.

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Labor Shortage Due to Aging Population

- Automation and remote operations help maintain efficiency with fewer workers, supporting sustainable productivity.

Improving Productivity

- Real-time data analysis streamlines operations, eliminates waste, and enables optimized workflows across industries.

Ensuring Public Safety (Crime, Traffic Accidents)

- Real-time data from cameras and sensors helps detect risks early and supports proactive crime and accident prevention.

Disaster Preparedness

- Edge processing enables rapid local response, while cloud systems support coordination and quick recovery after disasters.

Environmental Measures

- Monitoring and controlling energy use and emissions in real time promotes eco-friendly, sustainable operations.

Enhancing Service Quality

- Data-driven insights enable personalized services, improving customer experience and meeting individual user needs.

Digital challenges in Japan

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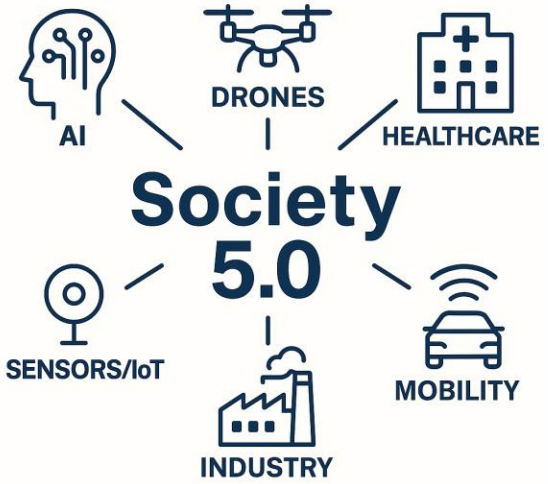
- The Cloud-Edge-IoT initiative is being carried out within the technology strategy and domain-specific strategies.



Domain strategy

- Agriculture Strategy
- Infrastructure Strategy
- Mobility Strategy
- Healthcare Strategy

Use cases
Field test

Technology strategy

- Innovation Strategy
- Digital Strategy

Data

Cloud-Edge services

Network

Edge devices

Private sectors

Agriculture Strategy
Agriculture DX initiative2.0 (2025-02-22)

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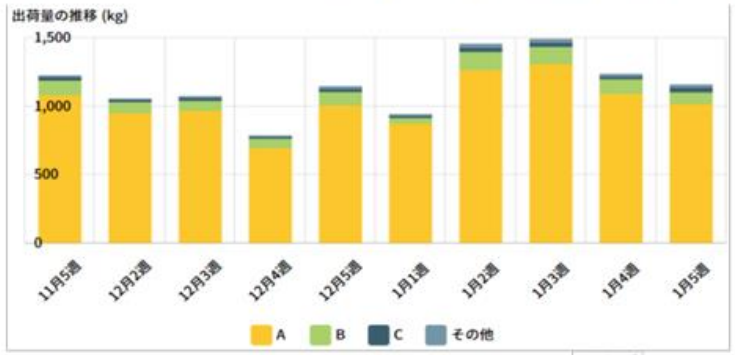
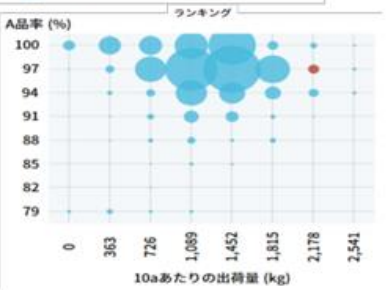
- The Ministry of Agriculture, Forestry and Fisheries is strongly pushing forward with digital transformation using data.

Sensor data related to agricultural production	Production Environment data
	Growth data
Data on agricultural management	Market data
	financial data
Logistics data	Logistics data
	Traceability data
Data from Administrations	Statistics
	Meteorological data
	Agricultural Land Data
	Soil Data

https://www.maff.go.jp/j/kanbo/dx/attach/pdf/nougyou_dxkousou-167.pdf





Leading case studies (Kochi-prefecture)

Summary of Agriculture DX initiative2.0

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- In the Ministry of Agriculture, Forestry and Fisheries' “Agriculture DX Concept 2.0”, sensor data utilization is emphasized as a means of promoting digital transformation (DX) in the agriculture and food-related industries.
  1. Utilization at the production site
     - By using sensor data, it is possible to grasp the growth conditions of crops, the condition of the soil, weather conditions, etc. in real time, and to carry out precision agricultural management. This is expected to lead to increased yields, improved quality, and more efficient use of resources.
  2. Improving the efficiency of agricultural management
     - Data-driven agricultural management that utilizes sensor data will improve the accuracy of management decisions and strengthen risk management. This will make it possible to improve profitability and achieve sustainable management.
  3. Rural development and environmental improvement
     - In rural areas, the use of sensor data will help to improve the efficiency of measures to prevent damage from wild animals and the development of agricultural infrastructure. This is expected to lead to the effective use of local resources and the resolution of local issues.
  4. Promoting data collaboration and utilization

     By utilizing the Agricultural Data Collaboration Infrastructure (WAGRI) to promote the sharing and collaboration of a wide range of data, including sensor data, it is hoped that new services and business models will be created.
- Through these initiatives, it is thought that the utilization of sensor data will accelerate the digital transformation of the agriculture and food-related industries, and contribute to sustainable food production and the development of local communities.

DX action plan for Infrastructure DX initiatives

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- In the Ministry of Land, Infrastructure, Transport and Tourism's “Introduction to Initiatives for DX in the Infrastructure Field”, the use of sensor data is emphasized as a way to promote digital transformation (DX) in the infrastructure field.
  - 1. Visualization of skills using motion sensors
    - At construction sites, motion sensors are used to digitize the movements of skilled workers, making their skills “visible”. This contributes to the construction of efficient human resource development methods and the advancement of the ability evaluation standards for the future Construction Career Up System (CCUS).
  - 2. Advancing unmanned construction technology using 5G and other technologies
    - The advancement of unmanned construction technology is being promoted by combining advanced technologies such as 5G with sensor data. This is expected to improve safety at construction sites and reduce the need for manpower.
  - 3. Building 3D city models and linking data
    - Based on 3D city models, work is underway to develop a digital infrastructure that can link and utilize a wide range of data related to urban planning. This will make it possible to carry out flexible and resilient urban planning that responds to real-time changes in urban conditions.
- Through these initiatives, it is hoped that the use of sensor data will contribute to improving productivity, ensuring safety, and creating new value in the infrastructure field.

Mobility DX Strategy

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- In the “Mobility DX Strategy”, the use of sensor data is seen as important in the digital transformation (DX) of the automotive industry.
  1. Improving sensor fusion technology:
     - The sophistication of various sensors and sensor fusion technology are being used to improve recognition performance and save energy. In particular, efforts are being made to improve recognition methods that utilize sensor RAW data, with the aim of further sophistication.
  2. Construction of a data linkage infrastructure
     - There is a drive to construct a data linkage infrastructure that will enable the comprehensive understanding, sharing and utilization of the vast amounts of data generated throughout the vehicle lifecycle, from manufacturing to use and disposal. This is expected to lead to the strengthening of supply chains and the creation of new businesses
  3. Utilization of driving data:
     - Trials are being conducted on a system that uses tire pressure sensors and other devices to collect and analyze data on road surface unevenness, and immediately assess the state of road deterioration. This is expected to improve the efficiency of maintenance work for road administrators and reduce repair costs.
- Through these initiatives, the use of sensor data is contributing to the creation of new value and services in the mobility field.

https://www.meti.go.jp/policy/mono_info_service/mono/automobile/jido_soko/index.html

Future Direction of Health Promotion Initiatives

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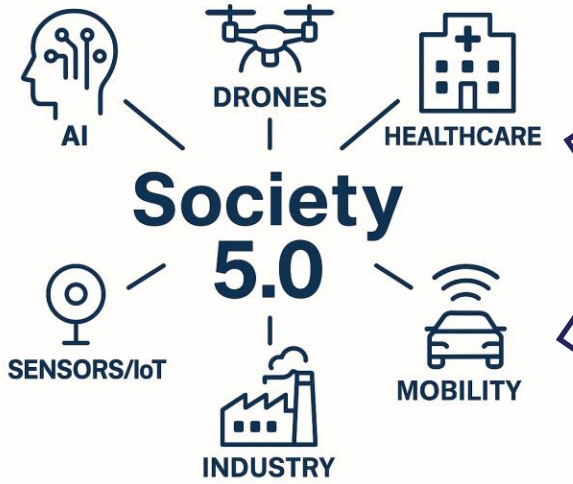
- In the Ministry of Economy, Trade and Industry's report “Future Direction of Health Promotion Initiatives”, sensor data utilization is emphasized as being important for extending healthy life expectancy and optimizing medical expenses.
  - 1. Promoting health management using wearable devices
    - By collecting health data on a daily basis using wearable devices and visualizing individual health conditions, it is possible to promote improvements in lifestyle habits and disease prevention.
  - 2. Utilizing personal health records (PHR)
    - By promoting PHR, which centrally manages personal health and medical information, and linking it with sensor data, it will be possible to provide personalized health management and medical services.
  - 3. Creation of new healthcare services through data utilization
    - We will support the development of services that analyze collected sensor data and predict health risks and encourage behavioral change.
  - 4. Promotion of health management
    - By having companies utilize their employees' health data and engage in health promotion activities, we aim to improve productivity and reduce medical expenses.
- Through these initiatives, the use of sensor data is expected to contribute not only to the maintenance and promotion of individual health, but also to the optimization of medical expenses for society as a whole and the creation of new industries.

https://www.meti.go.jp/shingikai/mono_info_service/kenko_iryo/pdf/20230824_1.pdf

Reinforcement of our challenge

- It is important to make use of Japan's strengths in the Edge field.
- We are strengthening cross-domain projects and digital infrastructure initiatives.



Domain strategy

- Agriculture Strategy
- Infrastructure Strategy
- Mobility Strategy
- Healthcare Strategy

Technology strategy

- Innovation Strategy
- Digital Strategy

Advanced use cases in the private sector and domains

Use cases
Field test

- Smart city Initiative
- Digital Infrastructure Initiative

Excellent devices and network

- Cloud-Edge services
- Network
- Edge devices

Private sectors

Digital infrastructure initiative

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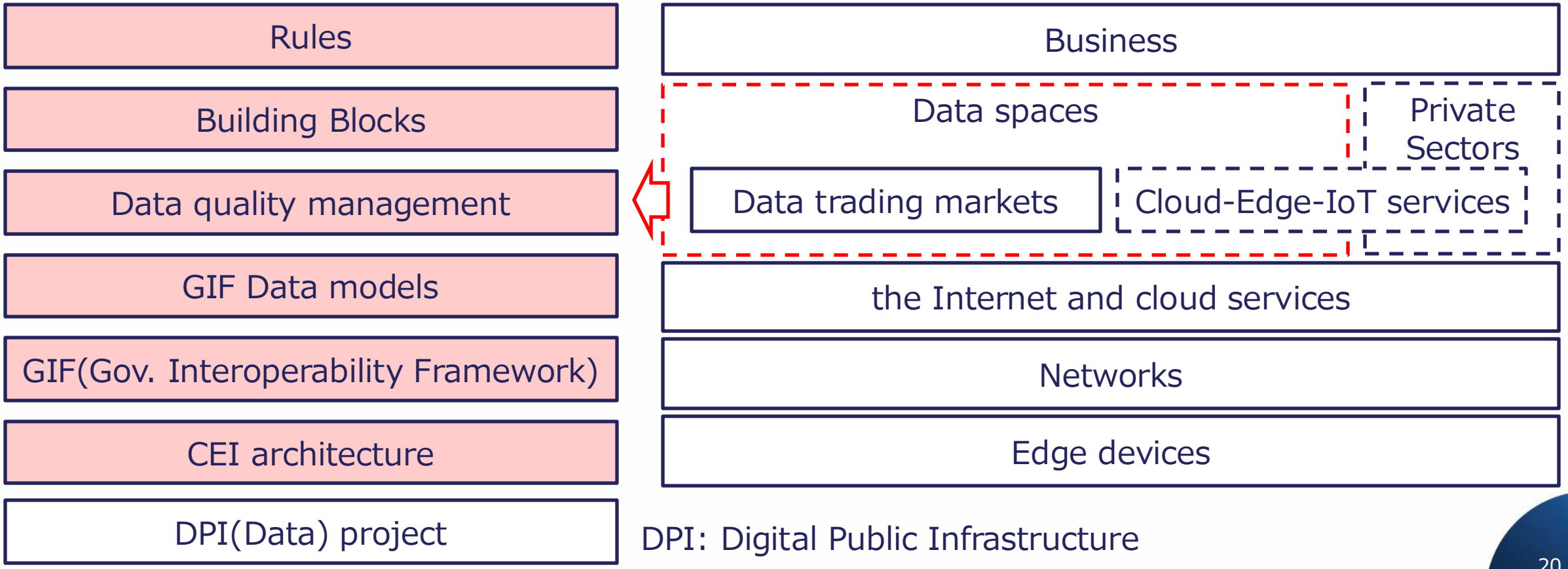
- Industry, government and academia are working together as one team to develop data infrastructure.



DPI: Digital Public Infrastructure

Smart city initiative

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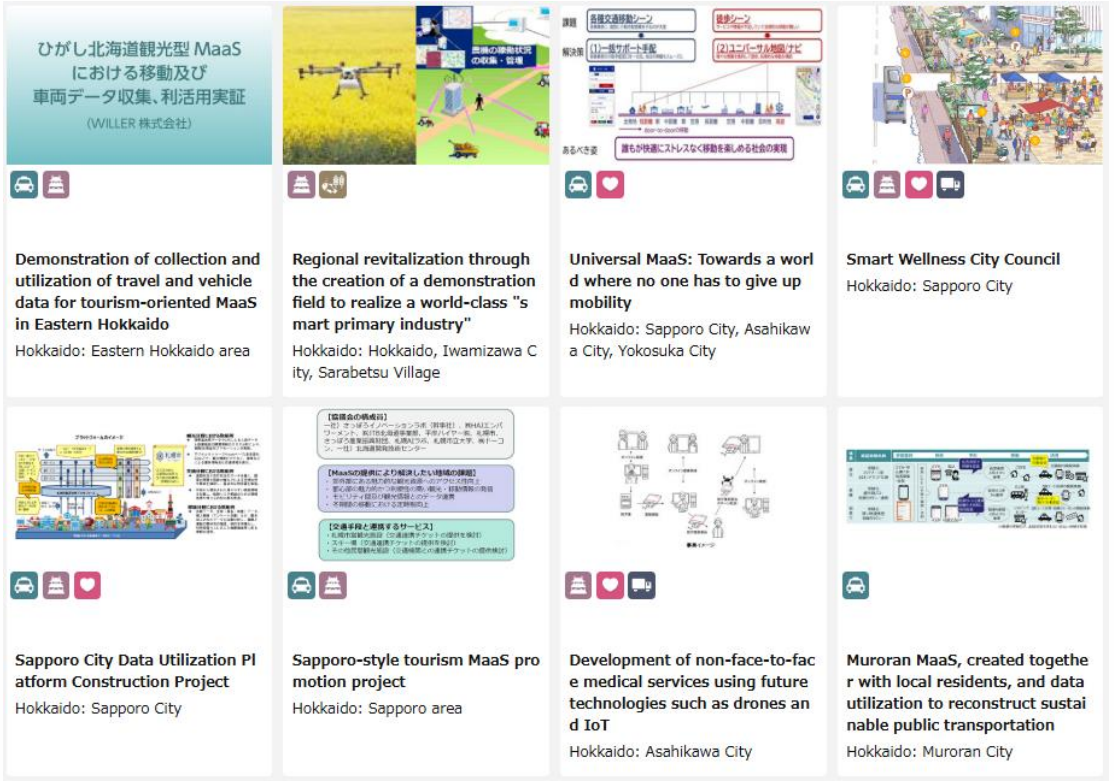
- In smart cities, many edge devices are used and data is shared across different fields.
- Cross-domain use cases are being tested.
- **The Smart City Reference Architecture**, which includes cloud-edge, will be revised.



Demonstration of collection and utilization of travel and vehicle data for tourism-oriented MaaS in Eastern Hokkaido
Hokkaido: Eastern Hokkaido area

Regional revitalization through the creation of a demonstration field to realize a world-class "smart primary industry"
Hokkaido: Hokkaido, Iwamizawa City, Sarabetsu Village

Universal MaaS: Towards a world where no one has to give up mobility
Hokkaido: Sapporo City, Asahikawa City, Yokosuka City

Smart Wellness City Council
Hokkaido: Sapporo City

Sapporo City Data Utilization Platform Construction Project
Hokkaido: Sapporo City

Sapporo-style tourism MaaS promotion project
Hokkaido: Sapporo area

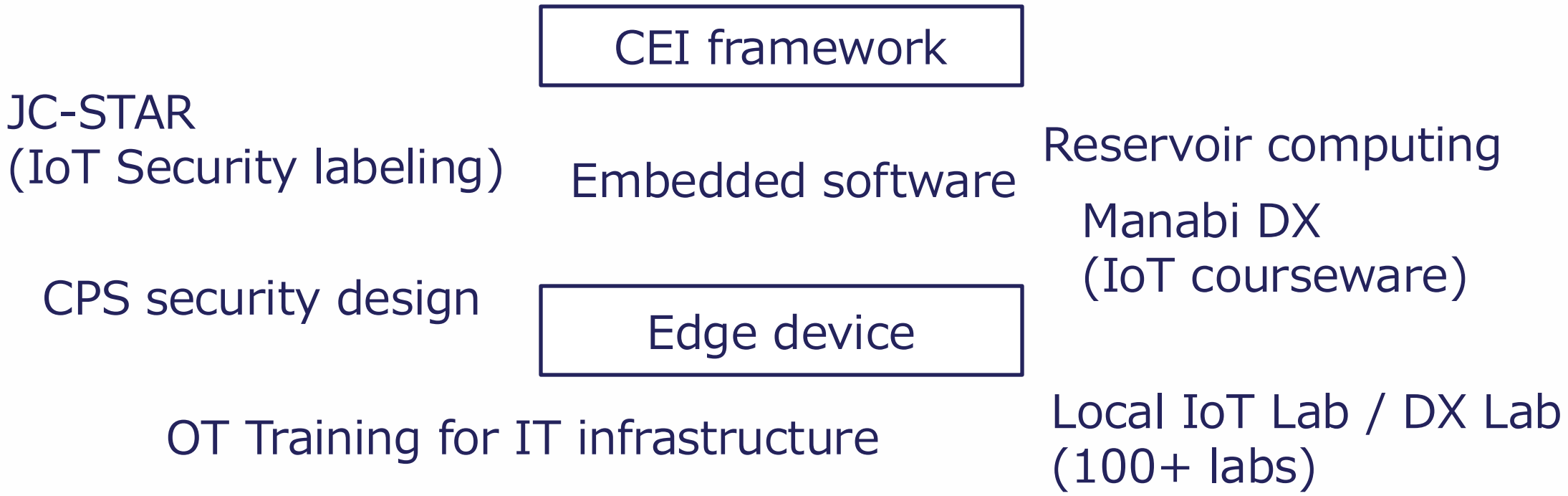
Development of non-face-to-face medical services using future technologies such as drones and IoT
Hokkaido: Asahikawa City

Muroran MaaS, created together with local residents, and data utilization to reconstruct sustainable public transportation
Hokkaido: Muroran City

- Mobility
- Healthcare
- Nursing
- Green

Edge related Activities in IPA

- IPA provides support for the development of edge-related technologies and human resource development.

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