Japan Can Offer Various Solutions (Cases and Examples）
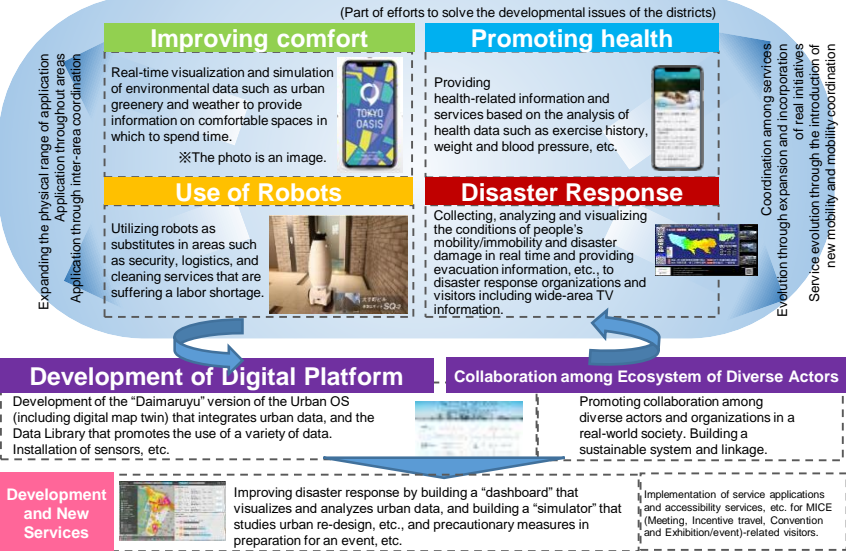
Data-driven smart cities ①
Otemachi, Marunouchi, Yurakucho districts smart city implementation plan (Chiyoda Ward, Tokyo)

As the area of central Tokyo that drives the Japanese economy, the area aims to become a state-of-the-art international business city by building a mechanism to create new value through "public-private partnership (PPP) and area management," which will "update and redesign existing cities" by utilizing technologies such as IoT and AI as well as urban data.
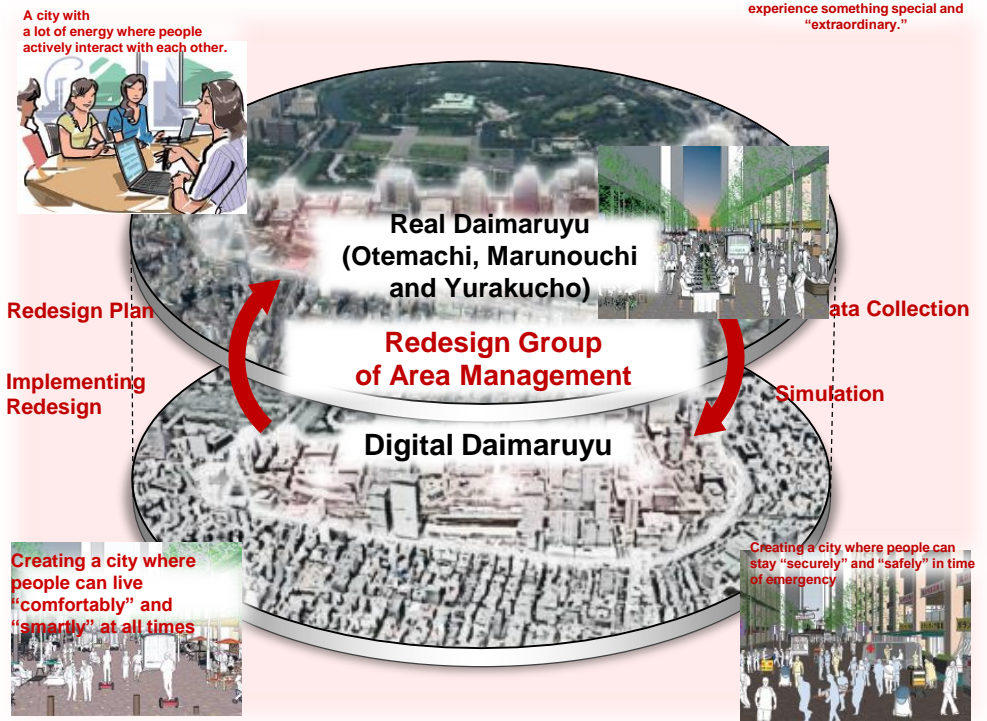
Goals

Economic benefits from the use of data: 64.5 billion yen per year (FY2025)
A curb on health-care costs associated with an increase in the number of steps taken by walking: 2.1 billion yen per year (FY2025)
The economic benefit of introducing robots (※): 1.8 billion yen per year (FY2025)
　　　※The economic benefit of different services generated by persons replaced by robots.
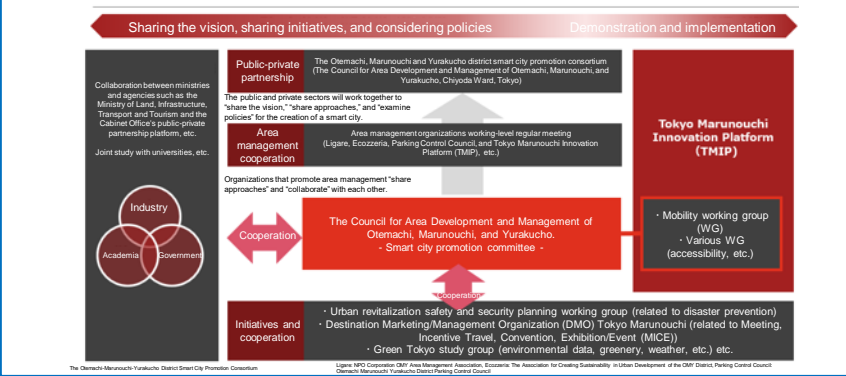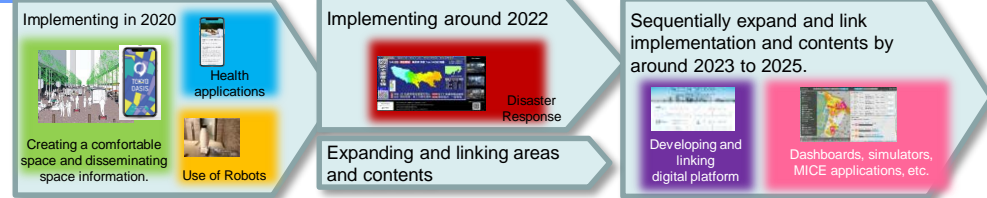
Details of the Plan

(Part of efforts to solve the developmental issues of the districts)

Expanding the physical range of application
Application throughout areas
Application through inter-area coordination

Coordination among services
Evolution through expansion and incorporation of real initiatives
Service evolution through the introduction of new mobility and mobility coordination

Improving comfort
Real-time visualization and simulation of environmental data such as urban greenery and weather to provide information on comfortable spaces in which to spend time.
　　　※The photo is an image.

Promoting health
Providing health-related information and services based on the analysis of health data such as exercise history, weight and blood pressure, etc.

Use of Robots
Utilizing robots as substitutes in areas such as security, logistics, and cleaning services that are suffering a labor shortage.

Disaster Response
Collecting, analyzing and visualizing the conditions of people's mobility/immobility and disaster damage in real time and providing evacuation information, etc., to disaster response organizations and visitors including wide-area TV information.

Development of Digital Platform
Development of the "Daimaruyu" version of the Urban OS (including digital map twin) that integrates urban data, and the Data Library that promotes the use of a variety of data. Installation of sensors, etc.

Collaboration among Ecosystem of Diverse Actors
Promoting collaboration among diverse actors and organizations in a real-world society. Building a sustainable system and linkage.

Development and New Services
Improving disaster response by building a "dashboard" that visualizes and analyzes urban data, and building a "simulator" that studies urban re-design, etc., and precautionary measures in preparation for an event, etc.

Implementation of service applications and accessibility services, etc. for MICE (Meeting, Incentive travel, Convention and Exhibition/event)-related visitors.

Future Image

A city with a lot of energy where people actively interact with each other.

Creating a city where people can experience something special and "extraordinary."

Real Daimaruyu (Otemachi, Marunouchi and Yurakucho)

Redesign Plan

Implementing Redesign

Redesign Group of Area Management

Data Collection

Simulation

Digital Daimaruyu

Creating a city where people can live "comfortably" and "smartly" at all times

Creating a city where people can stay "securely" and "safely" in time of emergency

Structure

Otemachi, Marunouchi and Yurakucho (Daimaruyu) smart city action plan

Sharing the vision, sharing initiatives, and considering policies　　　Demonstration and implementation

Collaboration between ministries and agencies such as the Ministry of Land, Infrastructure, Transport and Tourism and the Cabinet Office's public-private partnership platform, etc.

Joint study with universities, etc.

Public-private partnership: The Otemachi, Marunouchi and Yurakucho district smart city promotion consortium (The Council for Area Development and Management of Otemachi, Marunouchi, and Yurakucho, Chiyoda Ward, Tokyo)
The public and private sectors will work together to "share the vision," "share approaches," and "examine policies" for the creation of a smart city.

Area management cooperation: Area management organizations working-level regular meeting (Ligare, Ecozzeria, Parking Control Council, and Tokyo Marunouchi Innovation Platform (TMIP), etc.)

Organizations that promote area management "share approaches" and "collaborate" with each other.

Cooperation: The Council for Area Development and Management of Otemachi, Marunouchi, and Yurakucho. - Smart city promotion committee -

Tokyo Marunouchi Innovation Platform (TMIP)
・Mobility working group (WG)
・Various WG (accessibility, etc.)

Industry / Academia / Government

Initiatives and cooperation: ・Urban revitalization safety and security planning working group (related to disaster prevention) ・Destination Marketing/Management Organization (DMO) Tokyo Marunouchi (related to Meeting, Incentive Travel, Convention, Exhibition/Event (MICE)) ・Green Tokyo study group (environmental data, greenery, weather, etc.) etc.

The Otemachi-Marunouchi-Yurakucho District Smart City Promotion Consortium
Ligare: NPO Corporation OMY Area Management Association, Ecozzeria: The Association for Creating Sustainability in Urban Development of the OMY District, Parking Control Council: Otemachi Marunouchi Yurakucho District Parking Control Council

Schedule

Implementing in 2020
Creating a comfortable space and disseminating space information.
Health applications
Use of Robots

Implementing around 2022
Disaster Response
Expanding and linking areas and contents

Sequentially expand and link implementation and contents by around 2023 to 2025.
Developing and linking digital platform
Dashboards, simulators, MICE applications, etc.

Data-driven Case ②
Smart City Aizuwakamatsu (Aizuwakamatsu City, Fukushima Prefecture)
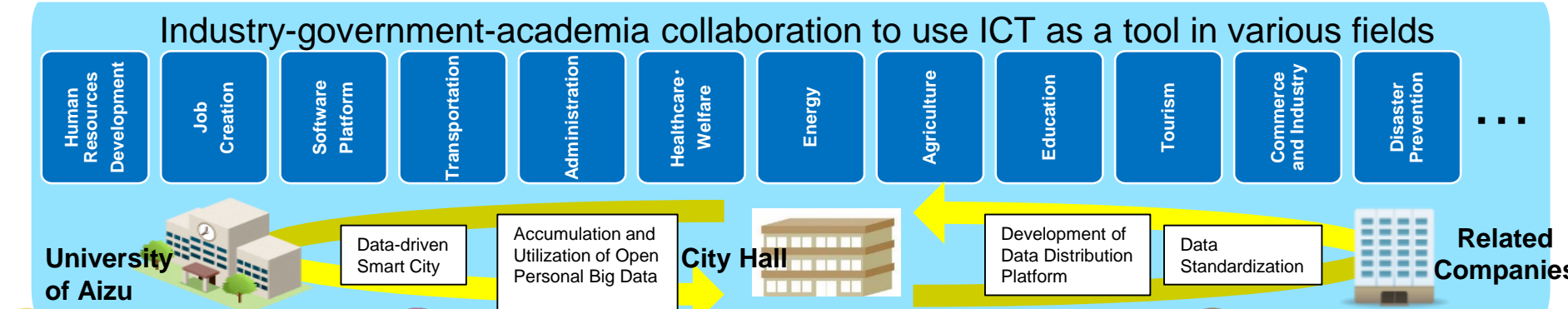
Promoting efforts using information and communications technology (ICT) in a variety of fields including health, welfare, education and disaster prevention, etc.

◆ **Overall Image**

Improving civic life and establishing ICT industry cluster

Development of "Smart City AiCT" with a capacity for up to 500 tenants, contributing to job creation in the region, the creation of a bustling atmosphere, and the nurturing of ICT human resources in the region (opened April 22, 2019)

Industry-government-academia collaboration to use ICT as a tool in various fields

| Human Resources Development | Job Creation | Software Platform | Transportation | Administration | Healthcare・Welfare | Energy | Agriculture | Education | Tourism | Commerce and Industry | Disaster Prevention | ... |

University of Aizu — Data-driven Smart City — Accumulation and Utilization of Open Personal Big Data → **City Hall** ← Development of Data Distribution Platform — Data Standardization — **Related Companies**

Administration

"Aizuwakamatsu Plus" that delivers information according to people's needs

As a gateway to local information, information needed for a particular person is displayed as recommended according to the person's attributes (age, sex, family structure, hobbies and tastes, etc.).

Tourism

"VISIT AIZU" that proposes sightseeing routes customized for individual needs

This is not simply a multilingual website of sightseeing spots for foreign visitors but presents different sightseeing contents by reflecting preferences according to the nationality of visitors depending on the language selected and the time of visit.

Regional Revitalization

"Minato Channel" is a system that supports life in hilly and mountainous areas

In the hilly and mountainous Minato district, building a system that supports people's lives enabling households to view information on municipal politics and the region and to reserve on-demand bus service on TV sets in their homes.

Agriculture, Forestry and Fisheries Industry

"Hydroponic soil cultivation system" that improves agricultural productivity and efficiency

Recommending the introduction of a hydroponic soil cultivation system that automatically supplies the optimal amount of water and fertilizer based on sensor-measured data (soil moisture, fertilizer concentration, etc.) to improve productivity and efficiency.

2

Data-driven Smart City ③
Kashiwa-No-Ha Smart City Action Plan (Kashiwa City)

Through regional management based on "public-private-academic cooperation" and "data-driven," aiming to create an "ever-evolving city" as a smart compact city centered on the station.

Increase in population by household, number of businesses, and resident satisfaction

[Mobility] Increase in the number of public transportation users and the number of pedestrians around the station, etc.
[Energy] Increasing the amount of CO2 reduction and electric power interchange, etc.
[Public Space] Increase the degree of facility round-trip and reducing the costs of road maintenance, etc.
[Wellness] Percentage of people with improved health figures, waiting time at hospitals, etc.

※Considering setting target figures in the future.

Details of the Plan — TRY the Future - An ever-evolving city -

Mobility
Improving the convenience of mobility within the region with the station at the center.
- Introduction of self-driving buses.
- Visualization and monitoring of traffic around the station.

Energy
Environment-friendly living toward a decarbonized society.
- Using a cloud computing system for area energy management service (AEMS) and improving the accuracy of demand forecasting.
- Maintenance management platform for solar power generation.

Public Space
Creating urban spaces that attract people and support their lives.
- Using monitoring data from AI cameras and sensors.
- Preventive maintenance management by sensing and AI analysis.

Wellness
A city where all generations can live in good health with vigor.
- Personal health service (Kashiwa-No-Ha Passport).
- Improving patient services by grasping the flow of people in the hospital.

Future Image — A smart compact city with the station at the center.

- Collecting and using data gathered in areas around the station
- Creating a compact living area supported by cyberspace
- Regional management through "public-private-academic cooperation" and "data-driven."
- A compact city model with the station at the center.

Energy
Using a cloud computing system for area energy management service (AEMS) and improving the accuracy of demand forecasting.

Mobility
Introduction of self-driving buses

Wellness
Improving patient services through the introduction of IoT technology. Improving operational efficiency in the hospital.

Public Space
Installing AI cameras and sensors, monitoring and data utilization.

(Entire region)

Kashiwanoha living lab

The University of Tokyo Kashiwa Campus
Chiba University Kashiwanoha Campus
National Cancer Center Hospital East
Chiba University Kashiwanoha Campus
Kashiwanoha Aqua Terrace
Kashiwanoha Campus Station

Data Platform

Energy
Maintenance of solar power generation facilities IoT platform

Wellness
Personalized services based on the Kashiwanoha Passport (tentative)

Mobility
Visualization and monitoring of traffic around the station.

Public Space
Preventive maintenance management by sensing and AI analysis.

(Entire city)   (Entire city)

Structure — System led by Kashiwa City, Mitsui Fudosan Co., Ltd., Urban Design Center Kashiwa-no-ha (UDCK) and UDCK Town Management

Data Platform	(Private sector data platform) Mitsui Fudosan Co., Ltd., Toppan Printing Co., Ltd., Nihon Unisys, Ltd., Hitachi, Ltd. (Public sector data platform) Kashiwa City, NEC Corporation.
Mobility	Kashiwa City, Mitsui Fudosan Co., Ltd., i-Transport Lab. Co., Ltd., Kashiwa Intelligent Transport systems (ITS) Promotion Council, Metropolitan Intercity Railway Company Tsukuba Express (TX), Chodai Co., Ltd., Mobility Innovation Collaborative Research Organization, The University of Tokyo, Pacific Consultants Co., Ltd.
Energy	Mitsui Fudosan Co., Ltd., UDCK, Nikken Sekkei Ltd., Nikken Sekkei Research Institute, Hitachi Ltd., Girasol Energy Inc., Each facility manager, Home management association.
Public Space	Kashiwa City, Mitsui Fudosan Co., Ltd., UDCK, UDCK Town Management, Okumura Corporation, Kawasaki Geological Engineering Co., Ltd., Fujitsu Traffic & Road Data Service Limited, related agencies, camera installation company
Wellness	Kashiwa City, Mitsui Fudosan Co., Ltd., UDCK, National Cancer Center Hospital East, National Institute of Advanced Industrial Science and Technology, Hitachi Ltd., nemuli, Loan Servicers Association of Japan, Institute of Gerontology, The University of Tokyo

Schedule

FY2021 Implementation

- Self-driving buses.
- Visualization of traffic around the station.
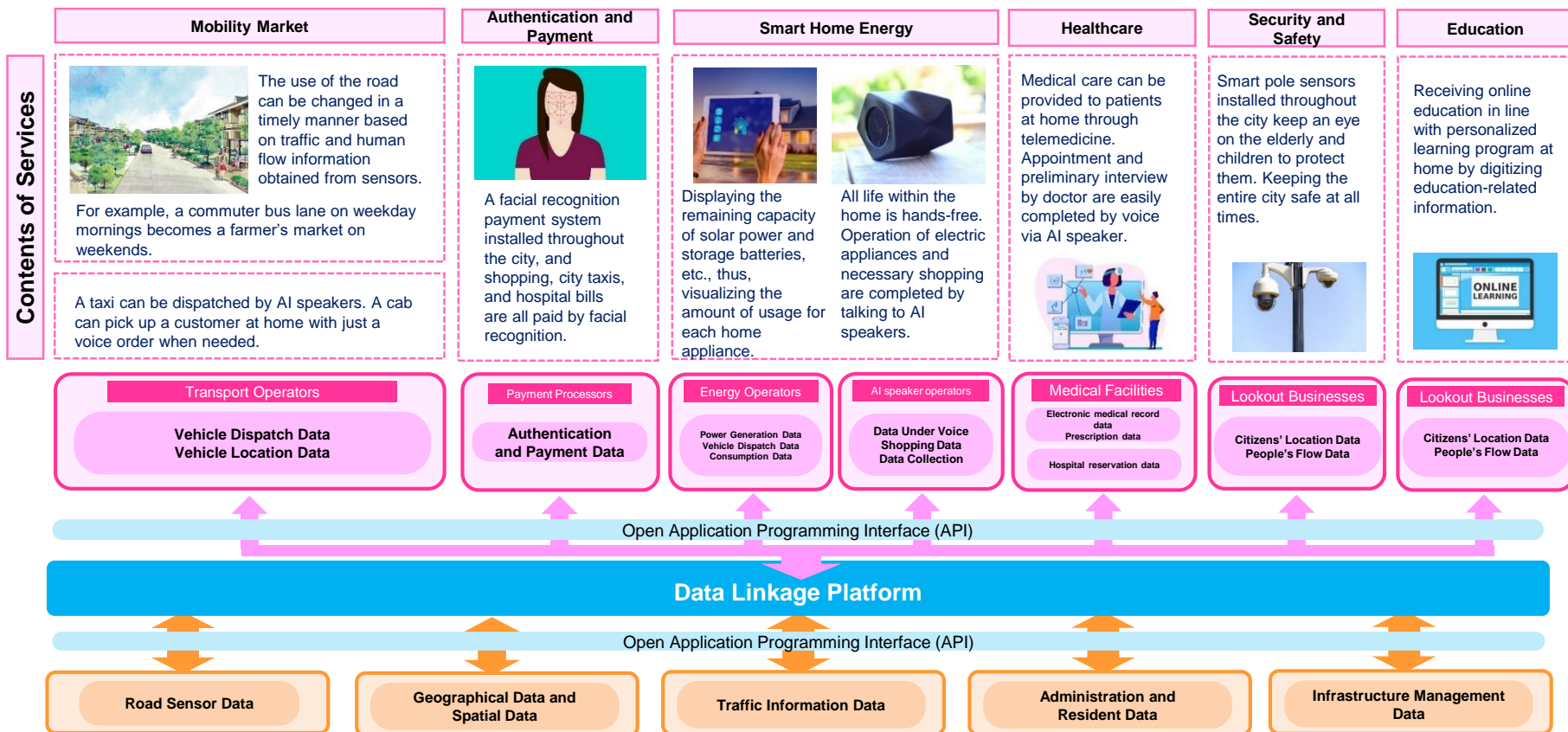- Advancing AEMS.
- AI monitoring.
- Kashiwa-No-Ha Passport

FY2022 Implementation
Preventive maintenance management

【Super City ①】
Super City with "sensing" and "voice recognition" as key technologies

- Taking on the challenge of urban development with "sensing" and "voice recognition" as key technologies in a greenfield type Super City.
- Ultra-comfortable living with full voice input by using AI speakers for life at home, and ultra-comfortable and safe living by maximizing the use of information from sensors installed throughout the city for life outdoors.

Contents of Services

Mobility Market	Authentication and Payment	Smart Home Energy	Healthcare	Security and Safety	Education

The use of the road can be changed in a timely manner based on traffic and human flow information obtained from sensors.

For example, a commuter bus lane on weekday mornings becomes a farmer's market on weekends.

A taxi can be dispatched by AI speakers. A cab can pick up a customer at home with just a voice order when needed.

A facial recognition payment system installed throughout the city, and shopping, city taxis, and hospital bills are all paid by facial recognition.

Displaying the remaining capacity of solar power and storage batteries, etc., thus, visualizing the amount of usage for each home appliance.

All life within the home is hands-free. Operation of electric appliances and necessary shopping are completed by talking to AI speakers.

Medical care can be provided to patients at home through telemedicine. Appointment and preliminary interview by doctor are easily completed by voice via AI speaker.

Smart pole sensors installed throughout the city keep an eye on the elderly and children to protect them. Keeping the entire city safe at all times.

Receiving online education in line with personalized learning program at home by digitizing education-related information.

Transport Operators	Payment Processors	Energy Operators	AI speaker operators	Medical Facilities	Lookout Businesses	Lookout Businesses
Vehicle Dispatch Data / Vehicle Location Data	Authentication and Payment Data	Power Generation Data / Vehicle Dispatch Data / Consumption Data	Data Under Voice / Shopping Data / Data Collection	Electronic medical record data / Prescription data / Hospital reservation data	Citizens' Location Data / People's Flow Data	Citizens' Location Data / People's Flow Data

Open Application Programming Interface (API)

Data Linkage Platform

Open Application Programming Interface (API)

Road Sensor Data	Geographical Data and Spatial Data	Traffic Information Data	Administration and Resident Data	Infrastructure Management Data

Regulatory Reforms through the National Strategic Zone System

Permission to operate self-driving cars, lifting of the ban on telemedicine and remote medication guidance, approval of transportation services by volunteer drivers, permission to install control sensors, etc.

【Super City ②】
Super City where provides utmost comfortability for those who "live alone"

- In a brown field Super City, taking on the challenge of creating a thoroughly comfortable environment for people to live alone, which is expected to increase due to the low birthrate, aging population, and diversified lifestyles.
- Realizing the "world's most comfortable city," as if a dedicated "virtual secretary" were providing services tailored to the needs of each resident.

Contents of Services

Administrative Services	Health Promotion	Secure and Safe Living	Mobility	Life Support	Recurrent Education
Fully digitizing administrative procedures. Realizing a virtual administrative window that is open "24 hours a day, 365 days a year" by also connecting with private sector services.	Providing optimal health services by centralizing and visualizing medical data from healthcare, nursing care, pharmacies, and health counseling, etc., and healthcare-related vital data.	Outdoor drones and in-home sensors are used to quickly detect residents' abnormalities. Completely realizing "zero loss of time" from finding an abnormality to reporting the incident to transporting a resident to the emergency room.	By predicting residents' desire to go out and time zone of going out, automatically arranging self-driving vehicles or ride-sharing services for optimal mobility.	Using purchase history and preference information provided by an individual to predict purchase intent. Supporting residents in their daily lives with automatic ordering and delivery.	Providing web-based educational programs that allow residents to learn based on their individual interests.
		Optimizing the movement of elderly, disabled, and other residents who require special consideration by combining location information and equipment control. Realizing the smooth, "trouble-free and stress-free" movement of residents.			Carrying out follow-up study in line with the learning log and history.

Administration	Healthcare Providers	Security Businesses	Real Estate Management Businesses	Transport Operators	Merchandise Distributors	Education Businesses
My Key Platform	Vital Data	Drone Image and Emergency Call Data	Elevator Operation Data	Vehicle Dispatch Data Vehicle Location Data	Purchase history data and Recommendation data	Learning history data and information on the level of understanding data

Open Application Programming Interface (API)

Data Linkage Platform

Open Application Programming Interface (API)

Administrative Data	Geographical Data and Spatial Data	Healthcare and Nursing Care Data	Traffic Data	Resident Data

Regulatory Reforms through the National Strategic Zone System

Permission to operate self-driving cars, permission to fly drones, permission to install control sensors, and remote control of various equipment, etc.

① Realizing the world's safest and securest society (disaster preparedness and crime prevention)

Concept: Real-time notification of emergencies and hazards to residents in wide areas. Promptly providing security and safety.

Issues of Urban Cities and Goals

《Issues》
- Deterring terrorism and crime while protecting individual privacy.
- Responding to the increase in disasters associated with climate change (disaster prevention and reduction).
- Through the abovementioned measures, making residents' living more comfortable, thereby increasing the attractiveness of cities.

《Goals》
- Crime control.
- Improving urban risk assessment.
- Prompt and effective disaster prevention and reduction.
- Improving residents' lives.
- Increasing population inflow.
- Increasing the rate of attracting conferences, events, and regional business bases.

Japan Can Offer Various Solutions

- Detection, prediction, and advanced analytical skills to grasp on-the-spot situation. thereby, reducing response time.
- Personal identification while ensuring personal privacy.
- End-to-end connectivity of ICT resources for rapid deployment and configuration optimization.
- Push-type notification of disaster and evacuation information by community applications by taking advantage of location information.
- Urban development using big data (human flow data, health data, etc.).

(Remarks)
- Japan is a safe country with one of the lowest crime rates among developed nations (ranked 3rd to 7th in recent years according to a United Nations survey).
- In addition, despite the fact that the United Nations disaster risk assessment report identified Japan as an area at high risk of all kinds of disasters, Japan was successfully able to control flood damage.

Places visited for on-site inspection	• Kakogawa City, Hyogo Prefecture • City of Las Vegas (U.S.)

Participating Companies (main operators)	• Kakogawa City, Hyogo Prefecture • NEC Corporation • NTT

The whole community working together to look after the community (Kakogawa City, Hyogo Prefecture)

Promoting the use of data in the field of safety and security, etc., with the aim of creating a "city of choice for child-rearing generations."

Main Efforts

(1) Realizing three project goals

Safe and Secure Infrastructure Integrated Dashboard (Display Application)
- Displaying layer of data by field
- Centralized grasping of each region through multi-layered display
- A prototype will be built for this project. (Considering necessary functions and screen layout, etc.)
- From next year or after, the functions will be updated for full-scale operation.
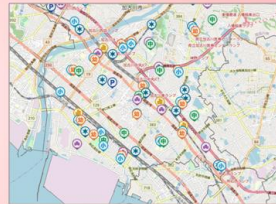
(2) Safe and secure infrastructure Integrated data platform.
(3) Multi-field data utilization

i) Monitoring cameras (Fixed type)	ii) Monitoring service (Fixed type)	iii) Monitoring service (Mobility type)	iv) Wi-Fi Log	vi) Community Application Platform
Places to install, time for maintenance and operational status	Places where detectors are installed, detection information (Location information)	Probe data (Road conditions, traffic congestion)	Major communication carrier Wi-Fi log	i) Monitoring applications: Detection information, attributes of volunteers who participate / Child-rearing applications: Child-rearing-related information, health information / Disaster Prevention Applications: Disaster Information (L Alert cooperation) …

(Individual equipment · system)   (Individual smart phone applications)

(1) Three project goals
① Increase the number of immigrants and permanent residents by improving citizen satisfaction.
② Improving the quality of life and productivity of citizens and reducing the financial burden.
③ Strengthening local power (local communities) and regional revitalization.

(2) Safe and secure infrastructure Integrated data platform.
① Planning the adoption of cloud system and data collaboration.
② Composed with FIWARE as the center.
③ Open API for data utilization.

(3) Multi-field data utilization
① Urban planning for crime prevention: Information on security tag detection, security cameras.
② Urban planning for transportation: Bus location and vehicle-mounted sensors.
③ Urban planning for disaster prevention: Community application (push notification), and disaster prevention and disaster reduction Information (J/V/L Alert).

Monitoring — Creating a safe and secure city using ICT

Providing guardians with information on the location of children and the elderly with detectors installed in security cameras, postal vehicles, and official vehicles.

Mobility — Improving the convenience of regional public transportation

Opening up information on community bus location and bus stops, etc. by using a data linkage platform.

Disaster Prevention — Optimizing evacuation behavior through the timely distribution of information on disaster prevention and disaster reduction

Effective push notification of emergency and disaster information such as evacuation advisory, etc., by using location information

Mail vehicle   **Security camera**

Las Vegas Public Safety Solution

- Japan's NTT demonstrated and commercialized a public safety solution in the city of Las Vegas, U.S.
- Since then, have been rolling out similar solutions in the U.S. Japan and Southeast Asia.
- The data collected is managed by the Las Vegas city authorities. No personal information is left in the analysis results.

Advanced analysis ➡ Grasping on-the-spot situation

What is happening now? What will happen from now on?

Information from multiple sensors
- Crowd size.
- Specific person.
- Number of vehicles.
- Specific vehicle.
- Vehicle running in the wrong direction.
- Unusual sound (gunshot, scream, broken glass)

Real time detection (person, vehicle and unusual sound, etc.)

Advanced analysis Multi-sensor analysis Prediction of number of people

Sensor Management

NW/IaaS/PaaS

NW/IaaS/PaaS

Commercial cameras and acoustic sensors

Flexible deployment of the ICT resources needed to transfer sensor information through rapid and dynamic remote rollout and remote settings.

NTT's Data Center

Multi-Orchestrator

Cognitive Foundation

Realizing rapid deployment of ICT resources and the optimization of ICT resource configuration by linking virtualized ICT resources end to end.

Areas to be monitored

Reducing response time

Las Vegas City Control Center

8

② Maximizing the capacity of transportation and logistics infrastructure

Concept: Improving convenience for citizens and promoting industry through the provision of new mobility services such as MaaS, etc.

Issues of Urban Cities and Goals

《Issues》
- Developing a system to facilitate the smooth mobility of residents including the elderly and people with disabilities in particular who have difficulty traveling.
- Ensuring healthy life expectancy for residents.
- Revitalizing the local economy through increased human flow.
- Improving the attractiveness of cities.

《Goals》
- Improving the safety and convenience of residents' mobility. Improving the quality of life for vulnerable people in particular with limited transportation mobility by encouraging them to go out through increased opportunity to exercise and communicate.
- Easing congestion by making traffic more efficient.
- Creating sustainable cities where diverse generations live.
- Creating bustling cities.

A bustling scene in Sapporo City

Kasugai City's automated driving project.

Japan's Solutions

- Smart mobility.
  - Developing car sharing and bicycle sharing.
  - Providing on-demand last-one-mile mobility.
- Introduction of automated driving public transportation.
- Improving traffic accessibility using face authentication system (Providing seamless payment and services through face authentication system).
- Smart planning for urban development using data.
- Incentivizing residents to go out through the introduction of applications.
- Building a MaaS model that solves local issues by linking transportation methods with non-transportation services such as retail and tourism, etc. at destinations.

(Remarks)
- Over a period of 10 years, elderly people's physical strength and athletic performance were rejuvenated by the equivalent of 5 years through the exercise resulting from the increased walking opportunities.
- Increased residents' opportunities to go out. Opportunities for the elderly in particular to participate in social gatherings increased and the rate of care needs assessment decreased. A 30% reduction in the risk of developing dementia.

Sapporo City used big data (human flow data, health data, etc.) for its urban development.

Places visited for on-site inspection
- Sapporo City, Hokkaido
- Tsukuba City, Ibaraki Prefecture
- Kasugai City, Aichi Prefecture

Participating Companies Main Operators
- Smart Wellness City Council (Sapporo)
- Tsukuba Smart City Council
- Kozoji Smart City Promotion Study Group (Kasugai City)

Citizen Participation Smart City Action Plan to Realize Health and Comfort through ICT (Sapporo City)

Given the current situation in which the city's healthy life expectancy is below the national average and it ranks low among government ordinance-designated cities, aiming to make Sapporo City healthier and livelier through a smart city project with citizens' participation.

Goals
- Health Indicator:
  Increase in average walking time of about 20 minutes/day (about 30% increase) (2024)
- Bustle Indicator:
  Tourism-related consumption: 700 billion yen/year (about 20% increase) (2024)

Details of the Plan

Encouraging behavioral change through incentives such as health and wellness points, etc., and acquiring big data on mobility and health to use it for community development and health services.

Health Services
Promoting walking activity and providing health services through applications.

Walkable Urban development
Creating a town that makes people want to walk and ensuring efficient snow removal.

Health-related data **Mobility tracking data**

Health and wellness points
Using a smart phone to measure the number of steps walked by citizens, and "health and wellness points" are awarded according to the number of steps. The points can be used for public transportation, etc.

Citizen Participation and Behavioral Change

Improving health and liveliness of city

Area Management

Dashboard smart planning

Future Image

Promotion of walking with health and wellness points

(Inner City)

Developing spaces that make people want to walk through smart planning

Health advice through applications

Efficient snow removal by Smart Snow

Promoting excursions by providing information on events, etc., through applications and signage

Promoting the use of public transportation through health and wellness points.

(Suburbs)

Structure

Administration
- Sapporo City
  (Supervision and coordination with urban and health policies)

Relevant Organizations
- Sapporo City Center Data Platform Utilization Consortium.
- Sapporo Area Regional Data (SARD) utilization promotion organization.
  (Operation and utilization of the Sapporo ICT utilization platform)

Experts
- University of Tsukuba Professor Hisano
  (Policy guidance)

Private Companies
- NIKKEN SEKKEI Research Institute
  (Supervision, smart planning)
- Tsukuba Wellness Research
  (Health and wellness points, visualizing measures)
- AEON Hokkaido Co., Ltd. (Health and wellness points)
- Toda Corporation (Smart Snow)
- Deloitte Tohmatsu Consulting LLC (Smart area management)
- Tanita Health Link, Inc.
  (Health and wellness points, health data management)
- FeliCa Pocket Marketing Inc.
  (Developing and providing system)

Schedule

Implementing in 2021 (part of region)

Health and wellness points

Implementing in 2022

Health promotion applications — Smart planning — Dashboard — Smart snow

Smart City "Tsukuba Model" Action Plan (Tsukuba City, Ibaraki Prefecture)

In order to promote the social participation of the elderly, etc., with reduced mobility, aiming to create a city that facilitates their going out by providing a mobility system that allows them to travel safely, securely and comfortably without relying their own cars.

Goals

- Ratio of people whose daily transportation is by private car   85.8% (current %) → 83.5% (FY2024)
- Ratio of elderly people who feel life is comfortable   31.4% (current %) → 34.4% (FY2024)
- Smart city project user satisfaction   -% (current %) → 47.2% (FY2024)

Details of the Plan

Traffic congestion prediction using AI

Predicting congestion in advance and establishing an optimal traffic model to solve congestion by acquiring and analyzing traffic flow data.

The optimal operating model for public transportation

Developing an optimal public transportation model, including the development of operation plans that minimize waiting time costs by acquiring and analyzing human flow data.

Encouraging the elderly to go out using facial recognition

Developing services and building systems that encourage the elderly to go out by using facial recognition technology including "riding in a bus" or "payment."

Introduction of Personal Mobility

Integration of human physiological system with mobility to support the mobility of people with difficulty traveling, and implementation of a compact mobility system linked to a pedestrian signal information system.

Future Image

- Optimizing public transportation operations
- Facial recognition cashless payment and facility acceptance introduced to various social services
- Mobility services using facial recognition technology
- Mobility support for people with difficulty traveling

Structure

Tsukuba Smart City Council

Secretariat

Ibaraki Prefecture
Tsukuba City
University of Tsukuba

- Various coordination of projects carried out by the council
- Meeting of the council
- Accounting of the council
- Other necessary items

Preventing traffic congestion, etc., by optimizing traffic flow.	Improving operation services to promote the use of public transportation.	Encouraging the elderly, etc., to go out by improving the convenience of public transportation.	Providing a safe and secure means of transportation for the last mile.
University of Tsukuba Ibaraki Prefecture Tsukuba City	Kanto Railway Co., Ltd. University of Tsukuba Tsukuba City	NEC Corporation University of Tsukuba Joyo Bank, Ltd. Ibaraki Prefecture Kanto Railway Co., Ltd. Tsukuba City The Science and Technology Promotion Foundation of Ibaraki	CYBERDYNE INC. National Institute of Advanced Industrial Science and Technology (AIST) Ibaraki Prefecture Tsukuba City

Schedule

～FY2021 Implementation
- On-site demonstration of measures to prevent traffic congestion.
- Considering an appropriate operation schedule, etc.
- Implementation of MaaS by facial recognition.
- On-site demonstration of personal mobility.

FY2022～Implementation
- Implementation of measures to prevent traffic congestion.
- Considering a new form of public transportation management, etc.
- Implementation of various services by facial recognition.
- Introduction of personal mobility.

Kozoji New Mobility Town Action Plan (Kasugai City, Aichi Prefecture)

Realizing "Kozoji New Mobility Town" through the best mix of transportation, and continuing to promote residency to the younger generation and provide all residents with a sense of comfort, thereby; creating a sustainable and comfortable town.

Goals

- Certification of Requiring Long-Term Care rate 14.9% (current %) → less than 20.8% (FY2024)
- Number of people moving in 1,681 per year (current) → 1,721 per year (FY2024).
- Number of vacant houses 432 houses (current) → 400 houses (FY2023).

Details of the Plan

Providing a variety of mobility solutions for mobility issues
- Slow self-driving.
- Self-driving bus, etc.
- Shared taxi.
- Personal mobility.

Realizing area management that supports regional life
- Parking lot management.
- Security monitoring system in the region.
- Garbage truck operation management.

Foundation to support the initiative
- Transport society dynamic map.

Services that support mobility and life
- NT version MaaS.

Slow self-driving | Shared taxi | Personal mobility share
Transportation society DM
New Town (NT) MaaS (Decentralized platform)
~Sustainable and livable city~ Realizing Kozoji New Mobility Town Action
Parking lot management
Self-driving buses, etc.
Garbage collection management | Security monitoring system in the region.

Future Image (Ishiodai District)

In-Area Mobility
Garbage truck operation management
Parking lot management
Takamoriyama Park
Ishiodai
Regional Base
Chuoda
Mobility within the area
NT Base
Center area
Security monitoring
In-Area Mobility
Subcenter
Iwanaridai
Key transportation
NT version MaaS that supports mobility
Kozoji Station
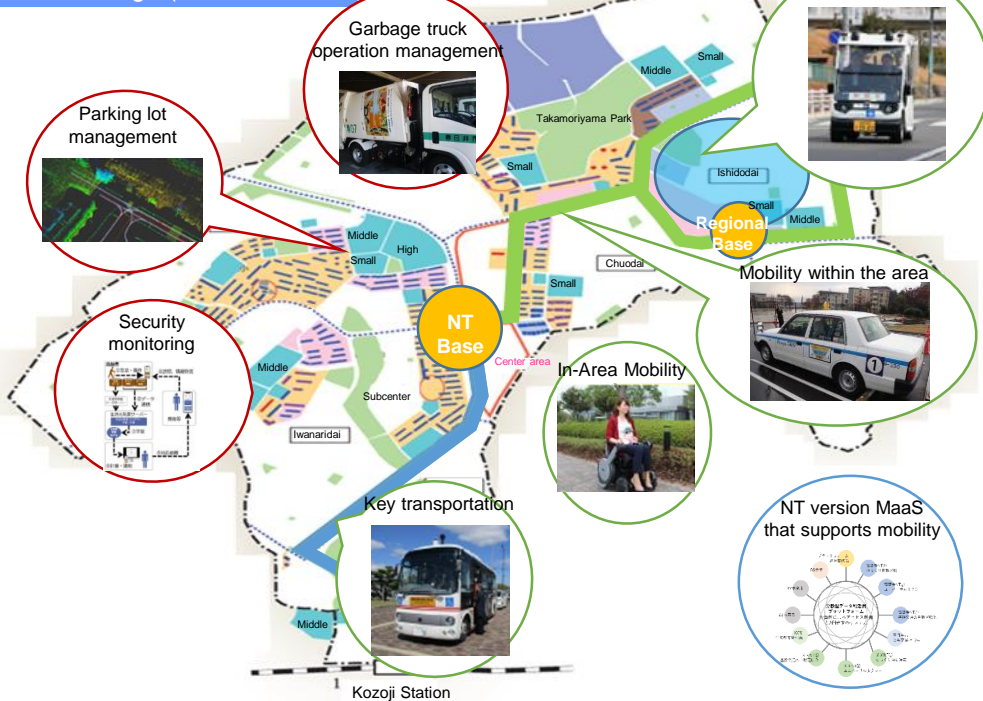
Structure

Nagoya University in Kasugai City

Mobility
Meitetsu Bus Co., Ltd
Kasugai City Taxi Association
KDDI Research, Inc.

Area Management
Urban Renaissance Agency
Kozoji urban development company
Meitetsu Kyosho Co., Ltd. and NEC Corporation
Chubu Electric Power Co., Inc.

Schedule

※ Adjustments are made based on the results of demonstration tests, etc.

FY2020 Implementation

Shared taxi

FY2021 Implementation

Last mile self-driving

Phased implementation in FY2023 and after※

Parking lot management, etc.

③ **Efficient use of energy and realizing energy conservation and zero emissions**

Concept: Encouraging the efficient use of energy and reducing greenhouse gas emissions. Also improving the resilience of urban cities.

Issues of Urban Cities and Goals

《Issues》
- Efficient use of energy.
- Developing urban infrastructure which is less dependent on utilities companies.
- Increasing greenhouse gas emissions.
- Stable use of renewable energy.
- Strengthening resilience at the time of disaster including securing energy in the event of a large-scale disaster.
- Treatment and utilization of livestock manure generated by the livestock industry.

《Goals》
- Reducing CO_2 emissions.
- Reducing greenhouse gas (GHG) emissions.
- Smart energy management.
- Realizing local production and local consumption of renewable energy.
- Industrializing local resources (example: establishing a hydrogen supply system).
- Strengthening the resilience of urban cities.

Japan's Solutions

- Local production and local consumption of energy with a focus on renewable energy.
- Industrialization of local resources, Shikaoi Town and Obihiro City (hydrogen, which does not generate CO_2, is produced from biogas obtained from livestock manure and used for fuel cell vehicles, aquaculture, etc.).
- Establishing autonomous distributed energy system.
- Dispersing electricity peaks according to demand response by using Community Energy Management System (CEMS).
- Establishing a locally produced and locally consumed energy system that utilizes CEMS, Home Energy Management System (HEMS), Building Energy Management System (BEMS), Electric Vehicle (EV), etc.
- Standardization of smart homes equipped with solar power generation system and storage battery unit.

(Remarks)
- The town of Shikaoi has been demonstrating GHG reduction through the use of livestock manure and hydrogen.
- Securing power at the time of a large-scale disaster. Establishing a disaster prevention base and maintaining hygiene in the event of a disaster.
- Another demonstration test confirmed a reduction of 9,000 tons of CO_2 emissions.

Places visited for on-site inspection	• Mutsuzawa Town, Chiba Prefecture • Fujisawa City, Yokohama City, Kanagawa Prefecture	• Shikaoi Town, Kato-gun, Obihiro City, Hokkaido

Participating Companies Main Operators	• Mutsuzawa Town, Chiba Prefecture • Fujisawa Sustainable Smart Town (SST) and Tsunashima SST • Shikaoi Town, Kato-gun, Obihiro City, Hokkaido

Building a hydrogen supply chain using hydrogen, etc., derived from renewable energy (Shikaoi Town, Hokkaido, Kawasaki City, Kanagawa Prefecture)

- Shikaoi Town, Kato-gun, Hokkaido】 Currently demonstrating a hydrogen supply chain in which hydrogen produced from biogas derived from livestock manure is transported through a simple transport system that utilizes hydrogen gas cylinders, which is used for stationary fuel cells, etc., at facilities in the region.
- 【Kawasaki City】 Currently demonstrating a hydrogen supply chain in which hydrogen obtained from the process of recycling used plastics is refined, transported through pipelines, and used for stationary fuel cells, etc., at commercial and research facilities.

Hydrogen=low-carbon energy	**Reduction and effective use of waste**	**Solving the problem of offensive odors caused by livestock manure**	**Realizing environmentally sustainable transport (EST)**
Energy Environment	Environment	Environment	Mobility Logistics Environment
➤ Hydrogen is a low-carbon fuel because it does not emit CO2 during its use. ➤ Since hydrogen can store energy for long periods of time, it can be used to store and keep renewable energy-derived electricity, which can fluctuate greatly in terms of power generation.	➤ Contributing to the reduction of waste by using used plastics as an energy source.	➤ Contributing to the improvement of the living environment in the surrounding area by using biogas derived from livestock manure as an energy source.	➤ Realizing environmentally sustainable logistics through the use of environmentally friendly fuel cell vehicles and fuel cell forklifts.

Creating a resilient town by using a decentralized and self-reliant energy system (Mutsuzawa Town, Chiba Prefecture)

● In Mutsuzawa Town, Chiba Prefecture, a decentralized and self-reliant energy system of local production for local consumption has been built in an area centered on the town's roadside station.
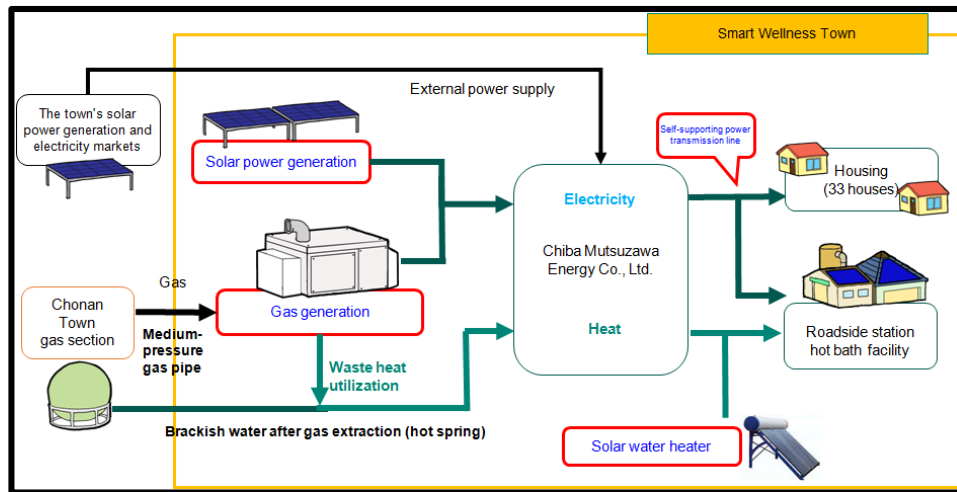
Overview of Mutsuzawa Smart Wellness Town

Disaster Prevention

Improving resilience against natural disasters, etc.

Self-reliant operation can provide electricity and heat <u>even during power outage</u> caused by increasingly severe natural disasters.

← Self-reliant operation provided electric power even during a power outage in the whole area caused by a large typhoon.

↑ Hot water was supplied during a power outage.

Energy   Environment

Using locally produced renewable energy, etc.

Reducing greenhousegas emissions through a <u>decentralized and self-reliant energy system that utilizes locally produced resources</u> including solar power generation equipment and solar thermal equipment.

Tourism

The roadside station as a center for town development.

Besides the "roadside station" as the sightseeing base, promoting settlement and intergenerational exchange in the town by integrating and developing "excellent regional rental housing."

Fujisawa Sustainable Smart Town (Fujisawa SST)

Constructing an environmentally conscious smart town at Panasonic's former Fujisawa plant, about a 19-hectare area (Fujisawa City, Kanagawa Prefecture). Occupancy started in 2014 and there are currently 561 households with approximately 1,900 residents.

Energy
Realizing carbon free housing through the thorough introduction of low-carbon technologies

Through the visualization of energy use and standardization of smart homes equipped with photovoltaic power generation system and storage battery unit in all detached houses, realizing a self-produced, self-consuming energy life, ensuring that energy supply will continue for three days even in an emergency.
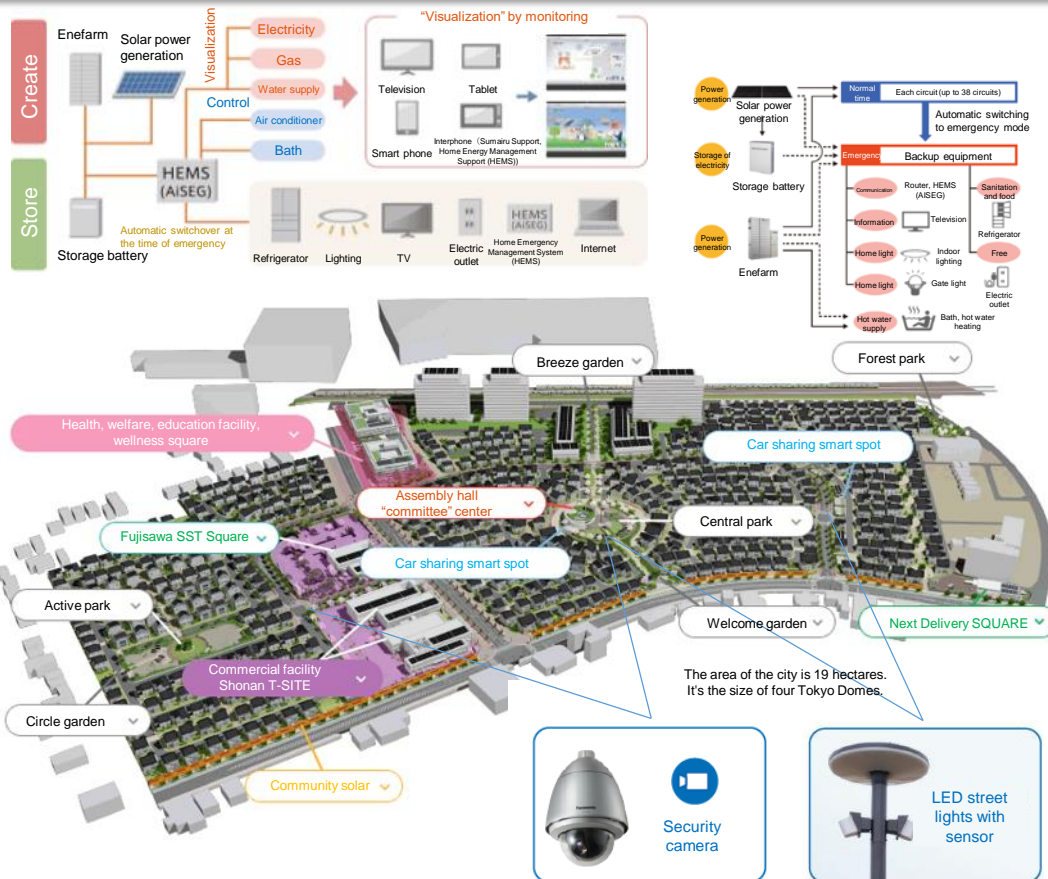
Mobility
Providing total mobility services according to the occasion of usage and needs.

Providing more convenient and eco-friendly mobility services, including electric vehicle (EV), electrically power assisted bicycle sharing, and delivery service of rental car close to home.
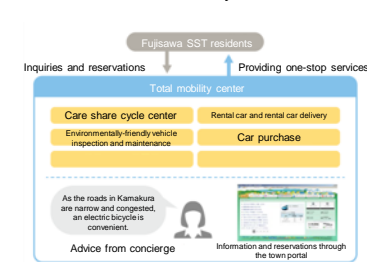
Two EVs are reserved. In case of an emergency, the V2H system supplies electricity to the assembly room, etc.

Monitoring
Realizing a safe and secure city by making full use of ICT

Realizing a safe and secure city with a security system covering the whole area, including security cameras, smart lights that detect people and increase their luminous intensity, patrol by security concierges, and PUSH transmission of disaster prevention information to home TVs in the event of an emergency,

The area of the city is 19 hectares.
It's the size of four Tokyo Domes.

Security camera

LED street lights with sensor
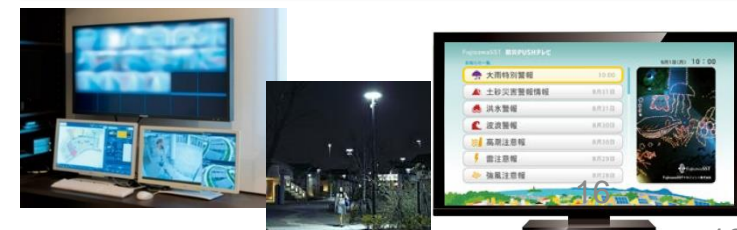
Tsunashima Sustainable Smart Town (Tsunashima SST)

- Grand opening of a sustainable, next-generation urban smart city at approximately 38,000 square meter former Panasonic factory site (Kohoku-ku, Yokohama City) through the co-creation of multiple businesses from different industries (FY2018).

Optimal and stable supply of diverse types of energy through data aggregation and utilization.
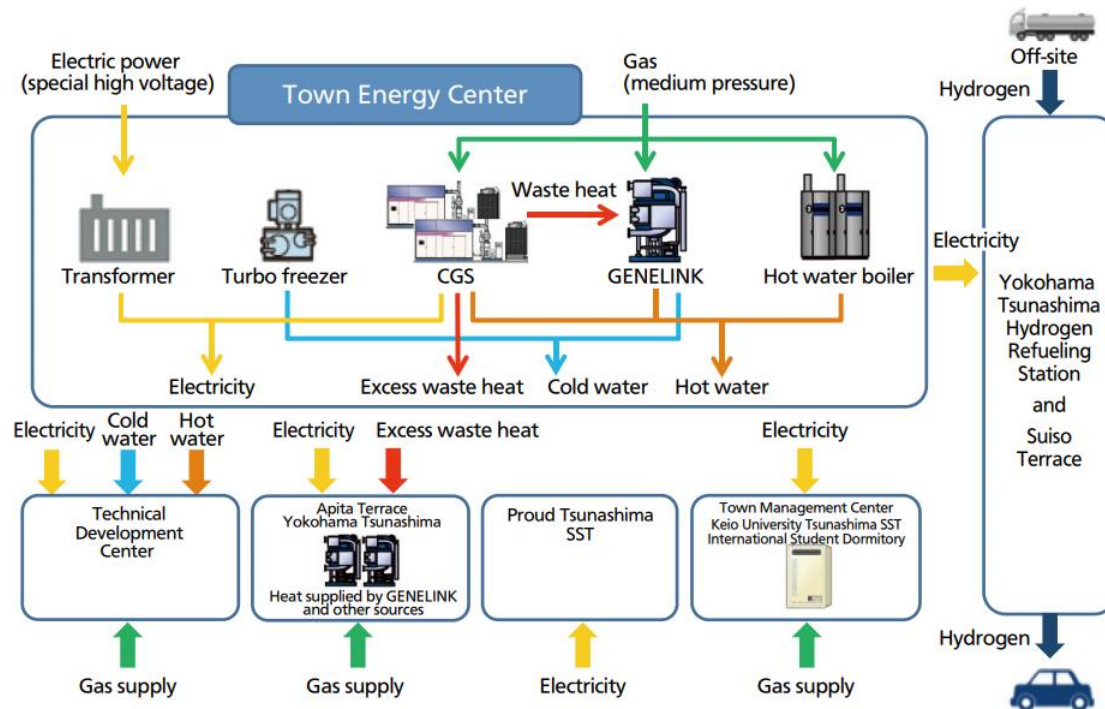
- Energy management for optimal use of diverse energy sources for the entire town (electric power and heat supplied from the Energy Center)
- Visualizing and monitoring the energy demand of the entire city. Realizing energy conservation and CO2 reduction by optimally accommodating the entire community.

Source: Tsunashima SST homepage "https://tsunashimasst.com/EN/about/smartservice"and others.

Efforts to improve the quality of life (QoL) by digitizing the town using IoT.

Considering the utilization of environmental data sensing and outdoor image recognition sensing, etc., for lifestyle support information for residents, optimal air conditioning control, and marketing in commercial facilities.

Environment sensing

Temperature distribution sensing

Outdoor image recognition sensing

Practicing management through System for Cross-Domain Identity Management (SCIM)

Providing smart services
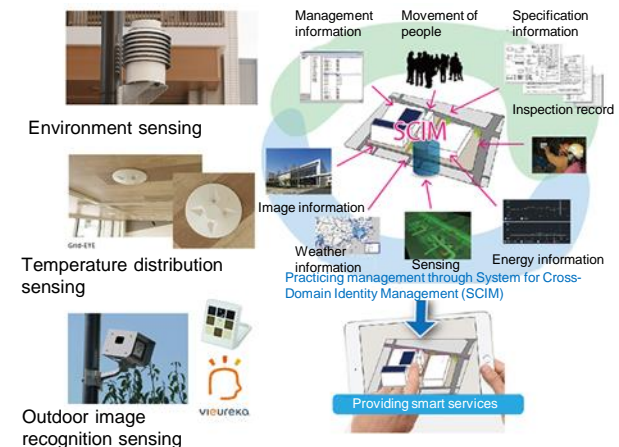
SCIM (Smart City Information Modeling) is a registered trademark of Obayashi Corporation, a member of the Tsunashima SST Council.

H₂ Initiatives Toward a Hydrogen-based Society

- Supplying hydrogen to fuel cell vehicles.
- Disseminating information on the characteristics of hydrogen and initiatives to use it.

④ Realizing the world's best recycling society

Concept: Urban development in harmony with the environment that promotes resource recycling. Realizing a recycling society.

Issues of Urban Cities and Goals

《Issues》

An increase in waste generation due to urbanization, industrialization and increased consumption.

- Tightening of the remaining capacity of final disposal sites.
- Diversification and increase in the types of waste, including large-size home electrical appliances that are difficult to properly dispose of, and increased use of containers and packaging.
- High concentration of companies and environmental technologies in industrial zones

Remaining capacity (million m³)
Remaining number of sustainable years (years)

9.8 8.6 7.9 8.6 7.9 8.3 8.8 10.0 10.6 9.7 8.3 8.0 7.6 7.8 8.2 8.1 8.7 8.5

239 214 192 182 176 171 174 196 207 195 171 167 157 157 154 149 151 142

1978 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
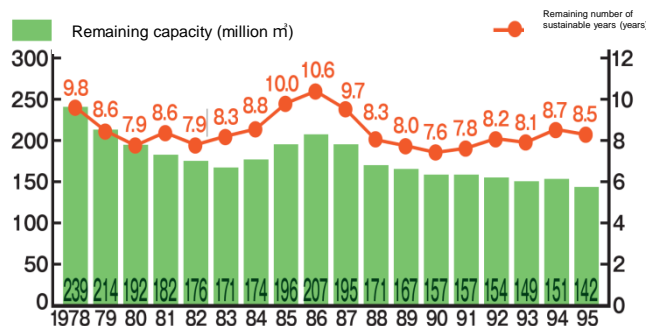
Remaining capacity and remaining number of sustainable years of the final disposal sites (general waste)

Source) Ministry of the Environment
"History and Current State of Waste Management in Japan" (February 2014)

《Goals》

- Building resource-recycling communities through the "Eco-Town Project."
  - Centralized development of recycling facilities in specific areas.
  - Development of various recycling laws at the national level.
  - High-level mutual use of waste within region.
  - Building a system and realizing zero-emissions.

Building-in of cooperation system
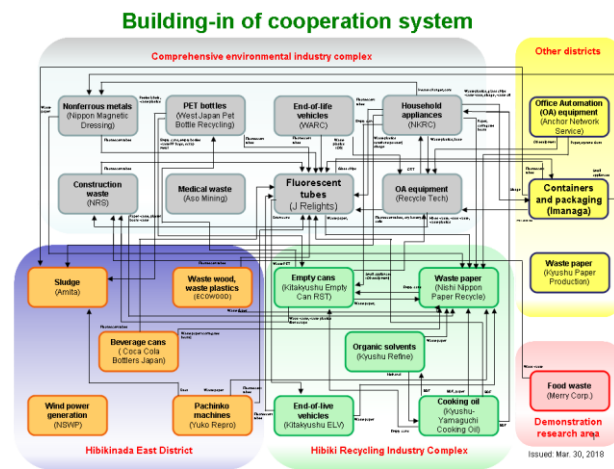
Voluntary mutual resource recycling among companies in an eco-town.

Japan's Solutions

- Significantly reducing environmental burden by reducing the amount of final disposal and the proper disposal of toxic substances.
- The development of arteriovenous collaboration through the expansion of arterial companies into the venous industry and the development of recycling.
- Progress in technological demonstration of E-Waste through centralized processing at regional level.
- Progress in human resource development for environmentally friendly industries in a region and developing it into international cooperation.
- Contributing to the decarbonization of region and realizing the SDGs through recycling and reduced energy use.
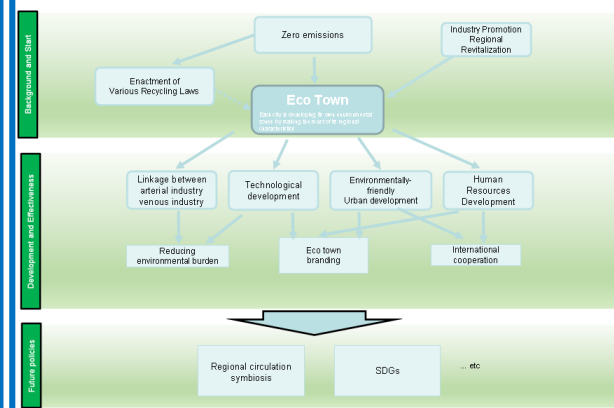
| Places visited for on-site inspection | • Kitakyushu City in Fukuoka Prefecture |

Resource-recycling, environmentally friendly urban development (Kitakyushu City)

- Formulating the "Kitakyushu Eco-Town Project" with a focus on the promotion of environmental and recycling industries by comprehensively covering **"education and basic research," "technology and demonstration research,"** and **"commercialization,"** which is called the Kitakyushu 3-point model, thereby; promoting the development of an advanced, environmentally friendly city centering on the promotion of resource recycling.

Details of the Plan

Demonstration research area

The Merry Corporation
Kawamurakoki Seisakusho Co., Ltd.
Kitakyushu Eco-Town Center
NCS Corporation
Waste treatment and research facility
Research Institute for Resource Recycling and Environmental Pollution Control, Fukuoka University
Nippon Steel Engineering Co., Ltd. Technology development headquarters
Technology development No.2 research institute
Kyushu Institute of Technology Eco Town Empirical study center

General environmental complex/Hibiki Recycling Area

Japan Environmental Storage & Safety Corporation (JESCO)
Toho Titanium Co., Ltd.
Nishinihon Kaden Recycle Corporation
Frontier zone
Recycle Tech Japan
Bicycle recycling zone
J Relights Co., Ltd. (Japan Recycling Light Technology & System)
West-Japan Auto Recycle Co., Ltd (WARC)
Aso Mining Company
Nishi Nihon PET bottle Recycle KK
Nippon Magnetic Dressing Co., Ltd.
NRS, Inc.

Strategies for the promotion of environmental industry (Kitakyushu 3-point model)

Education basic research
Technology and demonstration research
Commercialization
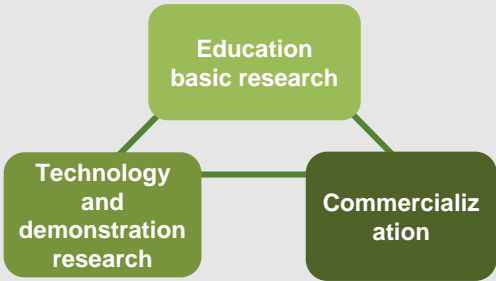
Comprehensive support from basic research to commercialization/Implementation of information dissemination to the public

Reduction of environmental impact through a significant reduction in CO_2

Environment

- Achieving <u>a significant reduction in CO2 emissions of 443,000 tons per year</u> by integrating recycling plants and promoting recycling.

Summary of 2016 survey results

▲433,000 tons/year — Environmental burden reduction effect (CO2 reduction)

◆Survey period: April 2015 - March 2016
◆Number of projects surveyed: 22

CO_2 reduction through recycling ▲503,000 tons/year

【Reference: Past survey results】
Environmental burden reduction effect (CO2 reduction)
FY2010:   ▲400,000 tons/year
※ Number of projects surveyed: 21
FY2005:   ▲304,000 tons/year
※ Number of projects surveyed: 14

CO_2 emissions from recycling process ▲70,000 tons/year

Recycling Industry and job creation

Economic revitalization

- In addition to the direct investment through the development of facilities and business operations as well as <u>the employment benefit of over 1,000 people</u>, there are approximately 100,000 visitors a year from Japan and abroad.
- Contributing to the reduction of unused land and the resolution of management issues including the reduction of unused land, securing a stable supply of raw materials and the sharing of know-how as pointed out by the relevant businesses in the eco-town.
- Exporting business support to Southeast Asian countries using the "Kitakyushu model" including waste management and environmental protection.

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⑤ Infectious disease control and public health that will set a new world standard

Concept: Improving public health through infrastructure development and preventing the spread of infectious diseases through remote and touchless technology.

Issues of Urban Cities and Goals

《Issues》
- Improving public health, thereby reducing and eliminating diseases and infectious diseases.

- Preventing the elderly, pregnant women and nursing mothers, and children, etc., in particular from physically contacting with an unspecified number of people at the time of an outbreak of an infectious disease.

《Goals》
- Appropriate treatment of wastewater through the development of basic urban infrastructure including sewage systems and decentralized wastewater treatment system "Johkasou."

- Appropriate waste management through basic urban infrastructure development.

- Ensuring the health of vulnerable residents, particularly the elderly, pregnant women and nursing mothers, and children, etc., at the time of an infectious disease outbreak.

Japan's Solutions

- Urban development with basic urban infrastructure including sewerage and decentralized wastewater treatment system "Johkasou," etc.
- Appropriate waste management through implementing Waste to Energy facility.
- Cutting-edge contactless technology such as touchless and automatic devices.
- A telemedicine system that utilizes mobile and cloud technologies. Through the system, the psychological, physical and economic burdens associated with going to hospital are reduced.

(Remarks)
- Decentralized wastewater treatment system "Johkasou" can treat sewage water to the same level as a collective sewage treatment plant (Biochemical Oxygen Demand (BOD) 20 mg/L or less, removal rate of 90% or more).
- The volume of waste can be reduced by almost one-tenth by Waste to Energy process.

Mobile measurement and monitoring devices can be used to grasp the health status of mothers and children.

Places visited for on-site inspection	• Hokkaido University Hospital • Nazetokushukai Hospital

Participating companies and main operators	Melody International Ltd.

Improving the water environment sector through overseas dissemination of sewage system know-how

・ Further promoting waste management in Asia by establishing the Asia Wastewater Management Partnership (AWaP), a partnership toward resolving issues regarding wastewater in Asian countries.
Implementing a demonstration project to contribute to the resolution of issues in the overseas sewerage field and to foster the understanding of Japanese sewerage technology.
Contributing to the dissemination of sewerage systems overseas through **collaboration among industry, academia, and government** by utilizing the know-how accumulated in the process of developing Japan's sewerage system.

Asia Wastewater Management Partnership (AWaP),

A partnership to further promote sewage management in the Asian region was established in 2018, which was aimed at achieving the SDGs (halving of untreated wastewater). Through this initiative, contributed to achieving the SDGs.

Partner Counties

Cambodia	Indonesia	Myanmar	The Philippines	Vietnam	Japan

Secretariat (Ministry of Land, Infrastructure, Transport and Tourism/ Ministry of the Environment)

AWaP's Organizational Structure

August 2019　AWaP Steering Committee (Yokohama City)

Overseas Demonstration Project of Sewerage Technology (WOW TO JAPAN Project)

Contributing to solving local issues by conducting demonstration tests **overseas** to foster understanding of Japanese technology among relevant local officials.

(WOW TO JAPAN Project) FY2019 Demonstration Technology

Demonstrated in: Myanmar
Demonstration technology: Flood control using a drainage pump vehicle.

Demonstrated in: Indonesia
Demonstration technology: Sewage pipe information database using cloud GIS.

Bandung City water supply corporation

Individual GIS data

| Sewer department | Maintenance and Management | Charge collection | Branch office |

Cloud GIS　Example of sewerage network
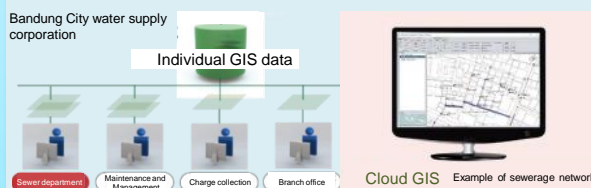
Examples of Adoption of Japanese Sewerage Technology in Overseas Projects

Creation of standard documents through industry-academia-government collaboration

○ The Vietnamese version of standards for pipe-thrusting method was developed based on the Japanese standards for pipe-thrusting method.

○ Handed over to the Vietnam's Ministry of Construction (2018.3: 5th edition).

The first edition delivered (2014.3)

Development of sewer pipeline

○ A Japanese company was awarded a contract to construct a sewer pipeline using the pipe-thrusting method in Ho Chi Minh City, Vietnam (FY2015).

Construction site of sewer pipeline

Technical Performance Certification by the Japan Sewage Works Agency

○ A Japanese company conducted a demonstration test of the pre-treated trickling method in Da Nang, Vietnam (FY2012).

○ The Japan Sewage Works Agency certified the performance, etc., of this technology (FY2013).

Demonstration facility

Sewage treatment plant development

○ A Japanese company was awarded a contract to construct a sewage treatment plant using this technology in Hoi An City, Vietnam (FY2016).
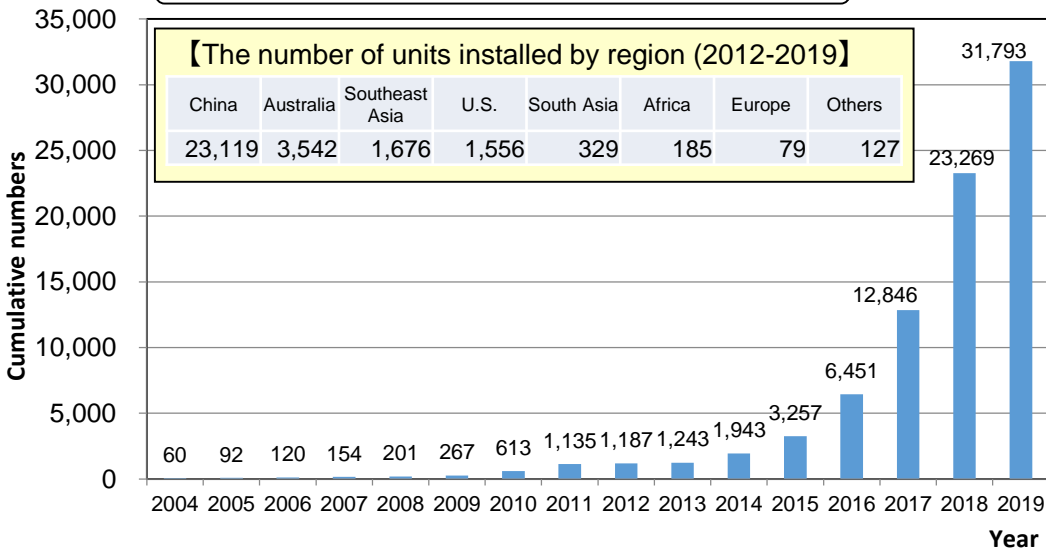
Hoi An Sewage Treatment Plant

Improving public health through the expanded use of decentralized wastewater treatment system "Johkasou" overseas

> The number of septic tanks exported in recent years has increased significantly as a system to cope with the deterioration of the water environment due to rapid urbanization, etc., (septic tanks are a highly developed technology in Japan, which attracts attention as a means of decentralized sewage treatment).

Number of Johkasou exported 【yearly total】

【The number of units installed by region (2012-2019)】

China	Australia	Southeast Asia	U.S.	South Asia	Africa	Europe	Others
23,119	3,542	1,676	1,556	329	185	79	127

Cumulative numbers (Year):
- 2004: 60
- 2005: 92
- 2006: 120
- 2007: 154
- 2008: 201
- 2009: 267
- 2010: 613
- 2011: 1,135
- 2012: 1,187
- 2013: 1,243
- 2014: 1,943
- 2015: 3,257
- 2016: 6,451
- 2017: 12,846
- 2018: 23,269
- 2019: 31,793

Strengths of Japan's extensive experience

> Efforts are being made to improve water quality as a decentralized treatment technology that contributes to water quality protection, and the legal system is being developed and technologies related to Johkasou performance and maintenance management are being accumulated. (As of the end of fiscal year 2018, 3.75 million combination treatment Johkasou have already been installed and operated)

Examples of Introducing Septic Tanks Overseas

← Large Johkasou (250m3/day) installed in a public hospital in Vietnam.

↑ Model installation of Johkasou in a farmhouse (lodging facility) on the outskirts of Xi'an, China (March 2019).

Improving public health
Public health

> Improving public health through proper disposal of human waste and sewage in urban and rural areas.
> Contributing to the prevention of bacterial infections caused by sewage through proper treatment of hospital wastewater.

Contributing to water environment conservation
Public health Environment

> Septic tanks have excellent treatment performance, capable of treating sewage water at the level of a collective sewage treatment plant (BOD 20 mg/L or less, removal rate of 90% or more) and also handling advanced treatment such as the removal of nitrogen and phosphorus.

Space saving installation and quicker return on investment
Environment Economy

> A septic tank installed in a private residence is compactly designed and can be installed in the space taken up by an average-sized car.
> Since the installation can be done in about a week, the effect is expected to be demonstrated quickly.

Improving resilience against natural disasters
Disaster Prevention

> It is characterized by its individualized treatment, early recovery, and response capability to disasters including earthquake, etc.

※ According to a survey conducted after the Great East Japan Earthquake, total loss was 3.8% (1,099 units in areas with seismic intensity of at least 6 on the Japanese scale or where the tsunami hit).

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Improving public health through waste and recycling technologies (Development of Waste to Energy plant in Myanmar)

- In Yangon, Myanmar, a Waste to Energy (WtE) plant has been developed by using Financing Program for JCM, generating energy by recovering heat from incineration process of municipal waste, which used to be landfilled in Final Disposal Site (FDS).
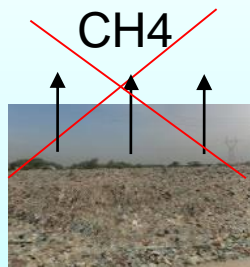
Waste incinerator power generation plant (Myanmar)

Aiming to expand to Yangon City and other areas through the experience of this model plant.

− 4,700 tCO2/year

GHG

60 ton/day

GHG

Waster incinerator power generation [0.7MW]
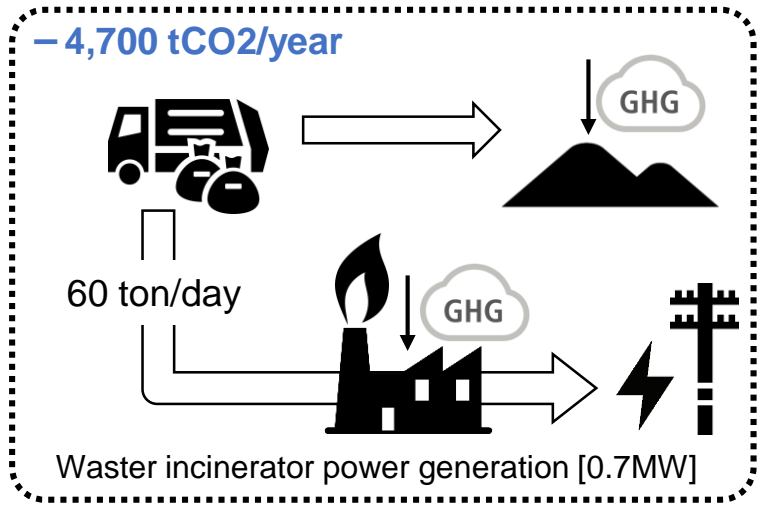
Reducing greenhouse gas emissions

Environment

- Recovery of energy from waste and reduction of greenhouse gases such as methane, etc.

CH4

Reducing final disposal volume

Environment

- The volume of waste can be reduced to almost one-tenth of its original volume by incinerating waste.
- Extending the life of final disposal site.

Improving public health

Public health

- Contributing to the preservation of the living environment and the improvement of public health through the proper waste management.

Grasping the health status of mothers and children

- Melody International Ltd., utilizes mobile measurement and monitoring devices to monitor the health of pregnant women, mothers and children and create a perinatal care environment that is not restricted by physical distance.
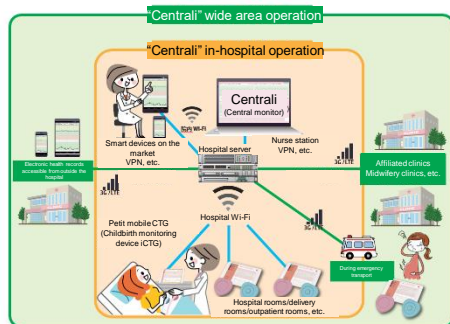
- Realizing consistent health management from pregnancy to child-rearing by linking with electronic maternal and child health handbook.
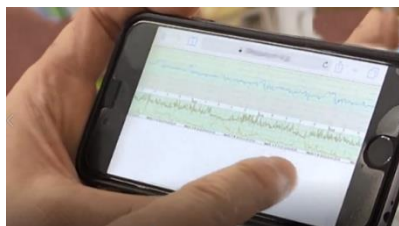
- Contributing to solving the shortage of doctors and reducing maternal and child mortality rates overseas.

Perinatal referral network covering the whole of Chiang Mai.
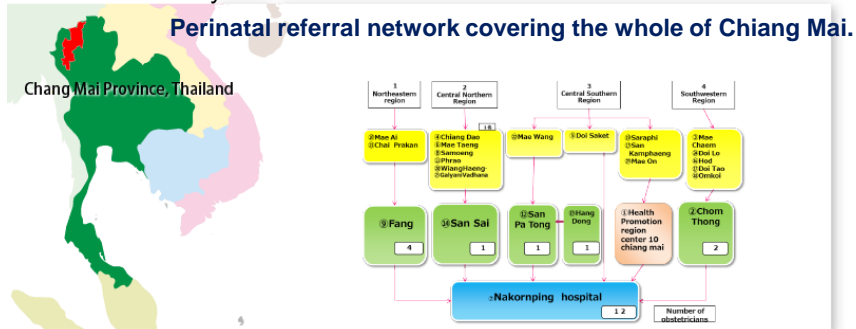
Source: Melodi International HP, created based on
(https://melody.international/business/melody-i.html)

Promoting a cashless society through the widespread use of "JPQR," the unified QR code

- Focusing on the effectiveness of daily cashless shopping as a means of maintaining appropriate "social distance" that has been brought to attention due to the new coronavirus pandemic.
- Promoting cashless transactions through a project to promote the United QR Code (JPQR) which reduces burdens on stores such as commissions.

Initiatives

- ◆ In March 2019, the Payments Japan Association, a general incorporated association, formulated United QR Code and Barcodes (JPQR).
- ◆ Based on the guidelines, the United QR Code, "JPQR" promotion project has been implemented from August 2019.

Unified QR Code

Advantages

- ◆ Facilitating payment for stores as a single "Unified QR Code" can be used to introduce multiple cashless services.
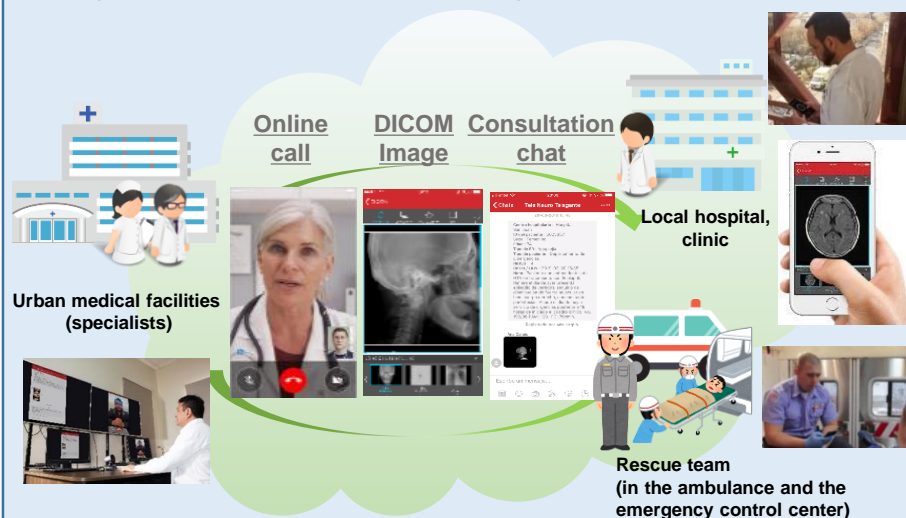- ◆ Touchless payment is effective in helping customers prevent infections.

A telemedicine system that utilizes mobile and cloud technologies

■ **Promoting early detection and preventive care of diseases through advanced medical and health care initiatives that utilize ICT including mobile and cloud technologies, etc.**

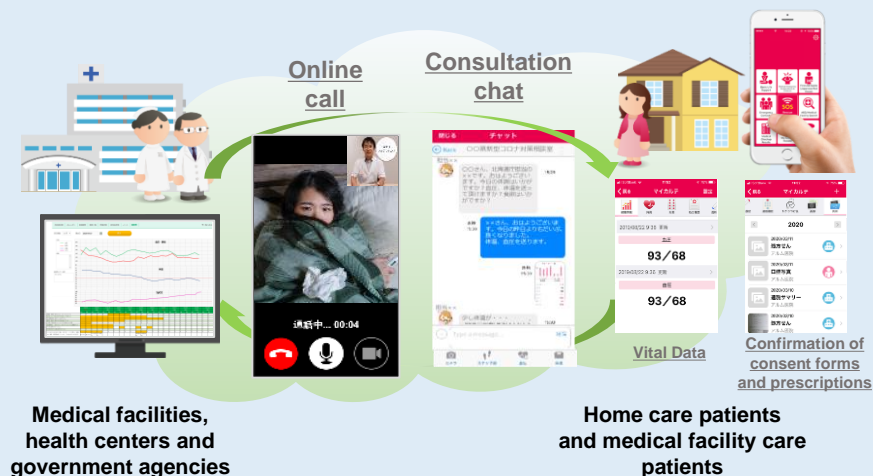**Examples of Practical Application**

Telemedicine network
➤ Realizing easy and accurate telemedicine by using smartphones.
  (Practiced in Brazil, Chile, etc.)
➤ Introducing an SNS-type mobile cloud service that allows medical professionals to share medical images and communicate with each other.
➤ Using a cloud outside the hospital reduces the burden of expensive server installation and operation costs.

Online call **DICOM Image** **Consultation chat**

Local hospital, clinic

Urban medical facilities (specialists)

Rescue team (in the ambulance and the emergency control center)

By using the cloud technology, possible to communicate with SNS while sharing images with smartphones or tablets.

Home treatment follow-up system
➤ Realizing easy telemedicine between medical professionals and patients (home care patients) by utilizing smartphones and cloud technology.
➤ Patients can contact their physicians through applications' chat and online calling functions by building a cloud-based personal medical information platform.
➤ Consolidating information on the cloud enables not only the doctor in charge of the patient but also the government to provide support to the patient from multiple professions.

Online call **Consultation chat**

Vital Data **Confirmation of consent forms and prescriptions**

Medical facilities, health centers and government agencies

Home care patients and medical facility care patients

Patients and healthcare professionals can communicate with each other via SNS while sharing health information through applications.

【Reference】 Examples of major international cooperation that can contribute to the response to infectious diseases (related to key projects)

・ Promoting, for the time being with particular emphasis, efforts that could contribute to measures against infectious diseases based on the "**Extraordinary G20 Digital Economy Ministerial Meeting Statement on the Response to Novel Coronavirus Infections**."

Improving "Internet Connectivity" (Strengthening digital infrastructure)

【Building stratospheric platform (PF)】
Building a communications environment through stratospherically located communications platforms (high-altitude platform station: HAPS), mainly in areas where it is difficult to develop fixed communications networks (Africa, etc.). Implementing by approaching the governments of Rwanda, Ethiopia and the Philippines, etc.

【Support for the development of broadband communication networks】
Supporting the overseas expansion of Japan's high-quality broadband communication networks, particularly in developing countries where the development of communication networks is lagging behind. Coordination is underway with the governments of the Philippines, Uzbekistan, etc.

(Example: Building stratospheric PF)

Features of High Altitude Platform Station (HAPS) as a communication platform
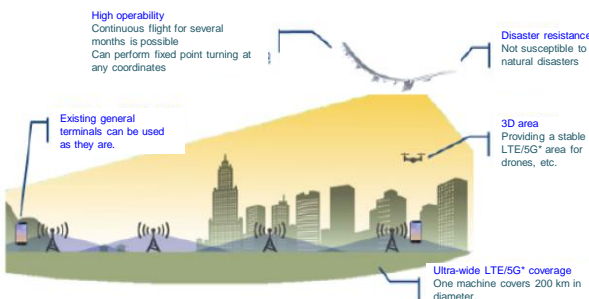
Promoting "data utilization" that protects privacy and ensures security.

【Free provision of human flow data analysis tool】
Analyzing the flow of people enables government agencies, etc., to understand where clusters occur. The analysis system developed by Professor Shibasaki of the University of Tokyo is provided free of charge. It is being used in multiple African countries including Angola, etc. Information has been provided to AU and Smart Africa.

※ Recipient governments can use this analysis system by simply installing it on serval personal computers.

(Example: Providing human flow data analysis tool)
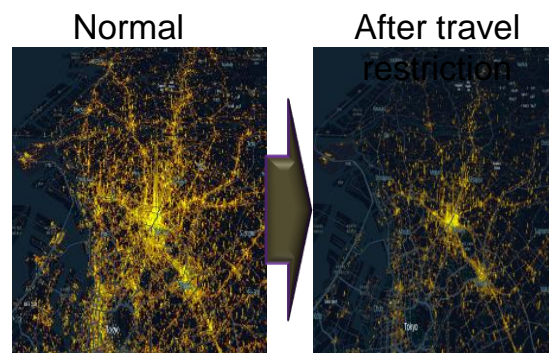
## Promoting the use of digital technology such as "telemedicine and telework."

【Expansion of Telemedicine System Overseas】
Specialist physicians will remotely examine CTs, etc., from persons suspected of being infected with COVID-19, which will avoid unnecessary transport and make possible rapid transport of patients in need of treatment to a specialist; thereby, realizing priority treatment and hospitalization of those who are truly in need. This is practiced in Brazil, etc., under the leadership of the Ministry of Internal Affairs and Communications. Coordination is underway with the governments of Rwanda, Thailand, etc.
【Survey of advanced telework cases, etc.】
Research on trends in countries where telework, etc., are actively practiced and promoted.

(Example: Supporting the building of telemedicine system)
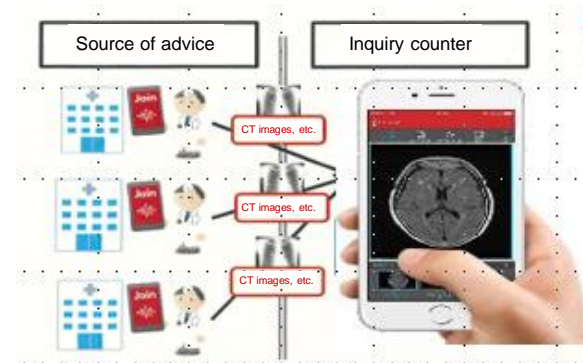
⑥ Expanding access to education and improving the quality of education (distance and online education)

Concept: Providing "inclusive and high-quality education that leaves no one left behind" by using ICT.

Issues of Urban Cities and Goals

《Issues》
- Further improving the quality of school education
- Eliminating regional disparities due to regional characteristics (remote islands and mountainous regions, etc.).
- Quality assurance and globalization in higher education.
- Ensuring learning opportunities in the event that schools are temporarily closed due to a disaster or the spread of an infectious disease.

School facilities damaged by the inflow of earth and sand due to heavy rain.

《Goals》
- Developing human resources capable of responding to innovation through the use of IoT and AI.
- Improving the quality of detailed education and reducing the workload of teachers and staff.
- Realizing quality assurance and globalization in higher education.
- Ensuring learning opportunities in an emergency situation.

Academic support by using ICT while schools are temporarily closed.

Japan's Solutions

- Drastic improvement of school ICT environment.
- Promoting the use of ICT in education.
- Improving efficiency of school affairs by using a school affairs support system.
- COIL(Collaborative Online Implementing Collaborative Online International Learning (COIL).
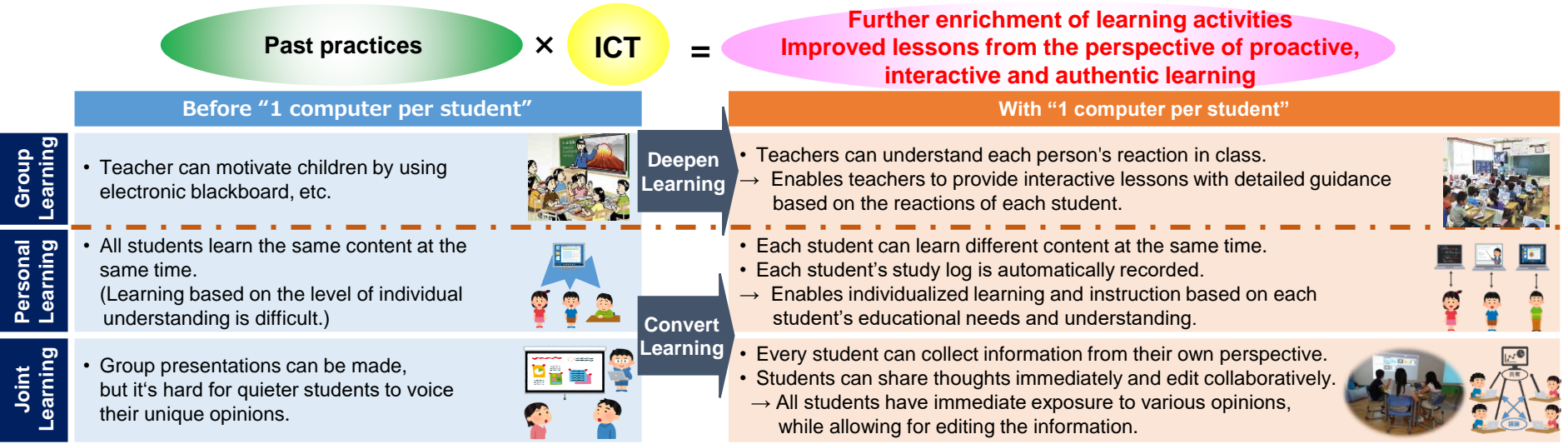- Implementing distance and online education.

COIL (Online session between Tokyo University of Foreign Studies and a university in the U.S.)

Transformation of learning brought about by "one computer per student" and high-speed networks

GIGA School Program: Realize an educational ICT environment optimized for each child, including those with special needs, and ensure further development of their abilities.
Maximize the power of teachers and students through the best mix of past educational practices and cutting-edge ICT technology.

Past practices × **ICT** = **Further enrichment of learning activities Improved lessons from the perspective of proactive, interactive and authentic learning**

	Before "1 computer per student"		With "1 computer per student"
Group Learning	• Teacher can motivate children by using electronic blackboard, etc.	**Deepen Learning**	• Teachers can understand each person's reaction in class. → Enables teachers to provide interactive lessons with detailed guidance based on the reactions of each student.
Personal Learning	• All students learn the same content at the same time. (Learning based on the level of individual understanding is difficult.)	**Convert Learning**	• Each student can learn different content at the same time. • Each student's study log is automatically recorded. → Enables individualized learning and instruction based on each student's educational needs and understanding.
Joint Learning	• Group presentations can be made, but it's hard for quieter students to voice their unique opinions.		• Every student can collect information from their own perspective. • Students can share thoughts immediately and edit collaboratively. → All students have immediate exposure to various opinions, while allowing for editing the information.

By effectively using each student's own terminal, investigative learning, expression and production activities become possible.
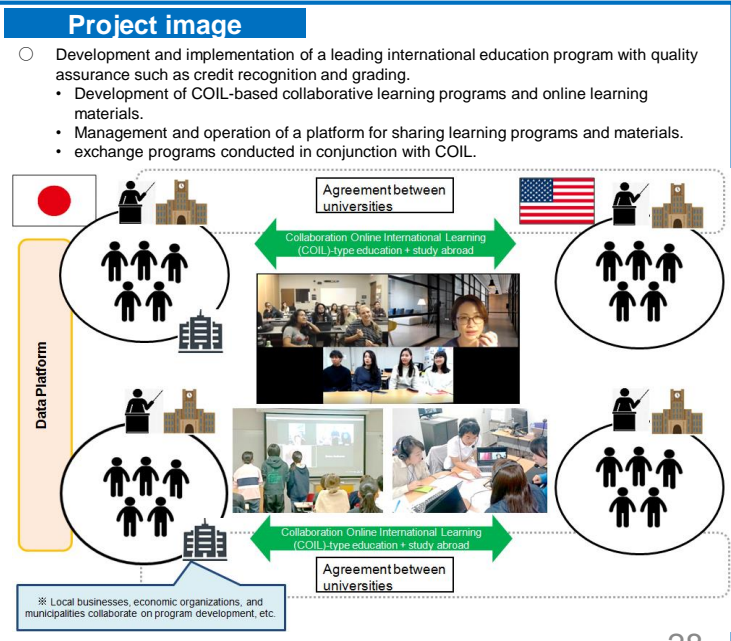
(COIL: Collaborative Online International Learning)

Implementing an exchange between universities in Japan and the U.S. based on Collaborative Online International Learning (COIL) approach.

Educational Methods

- <u>Online interactions before and after the start of study abroad.</u>
- Collaborating across borders and understanding the <u>differences in approaches, perspectives and cultures of other countries</u>.
- Providing the opportunity to develop a wide range of knowledge through online lectures and seminar exchanges while in one's home country.
- <u>Interaction according to a various number of people and purposes is possible.</u>

Expected Effects

- Providing collaborative online international learning opportunities <u>regardless of geographical conditions</u>.
- Strengthening cross-cultural adaptability through <u>teamwork and collaboration</u>.
- Increasing the number of students enjoying international educational opportunities and <u>ensuring continued network</u> with students in partner countries abroad.
- A synergistic effect that <u>increases and sustains the effects of studying abroad</u> is expected.

Project image

○ Development and implementation of a leading international education program with quality assurance such as credit recognition and grading.
  • Development of COIL-based collaborative learning programs and online learning materials.
  • Management and operation of a platform for sharing learning programs and materials.
  • exchange programs conducted in conjunction with COIL.

Agreement between universities

Collaboration Online International Learning (COIL)-type education + study abroad

Data Platform

Collaboration Online International Learning (COIL)-type education + study abroad

Agreement between universities

※ Local businesses, economic organizations, and municipalities collaborate on program development, etc.

⑦ Utilizing tourism resources to attract visitors from around the world

Concept: Revitalizing the local economy through tourism and the maximum utilization of tourism resources.

Issues of Urban Cities and Goals

《Issues》
・ Revitalizing the local economy through tourism. Increasing the attractiveness of cities to that end.
・ Connectivity and convenience of multiple modes of transportation.
・ Providing quality services with reduced workload.

《Goals》
・ Attracting visitors, promoting excursions, and revitalizing a region (through the establishment of a highly connected and convenient intra-regional mobility service).
・ Increasing the percentage of repeat tourists.
・ Maximizing the use of tourism resources.

Japan's Solutions

■ MaaS for sightseeing spots
・ Seamless coordination of multiple modes of transportation using MaaS applications. Promote collaboration with other industries including coupon distribution on the platform.
・ Support for tourist transportation in conjunction with on-demand car-sharing vehicle reservation and dispatch systems, etc., in tourist resorts.

【Reference】 "New Mobility Service Promotion Business" by the Ministry of Land, Infrastructure, Transport and Tourism supports eight regions including the following as "MaaS for sightseeing spots." (FY 2019)

(Example) Otsu City and Mount Hieizan areas.
In addition to free digital passes for multiple public transportation systems, providing MaaS that can be used at hotels, tourist facilities, retail stores, restaurants, etc. to promote excursions using public transportation.
(Operators: Keihan Holdings Co., Ltd. and Nihon Unisys, Ltd., etc.)

(Example) Izu area in Shizuoka Prefecture.
In addition to providing free digital rail and bus transit passes and operating on-demand transportation services such as MaaS, providing free digital passes for sightseeing facilities. In this way, developing a comfortable environment that allows seamless travel at destinations to promote tourism and revitalize local communities. (Operators: Tokyu Corporation, East Japan Railway Company, etc.)

• Providing a service that combines self-driving buses and trains, etc., at a flat-rate and unlimited-ride fare.
• Distributing coupons linked to shopping and sightseeing.
■ Seamless and cashless payment using face authentication technology.

| Places visited for on-site inspection	• Shirahama Town, Wakayama Prefecture • Oya district, Utsunomiya City, Tochigi Prefecture • Shizuoka Prefecture

Participating Companies Main Operators	• NEC Corporation (NEC) • U Smart Council (Utsunomiya City) • Shizuoka Prefecture, Softbank Corp.

Collection of Individual Cases:
Nanki Shirahama IoT Hospitality Trial

- Implementation of a demonstration project in Shirahama Town, Wakayama Prefecture that provides an environment in which people can use face recognition using their face as a common ID after registering their face information and credit card information at home or at the regional gateway airport.
- This trial aims to improve convenience for tourists and business travelers, support regional economic development through hospitality services in the Nanki Shirahama area, and contribute to the productivity of airport operations through advanced safety and security measures.
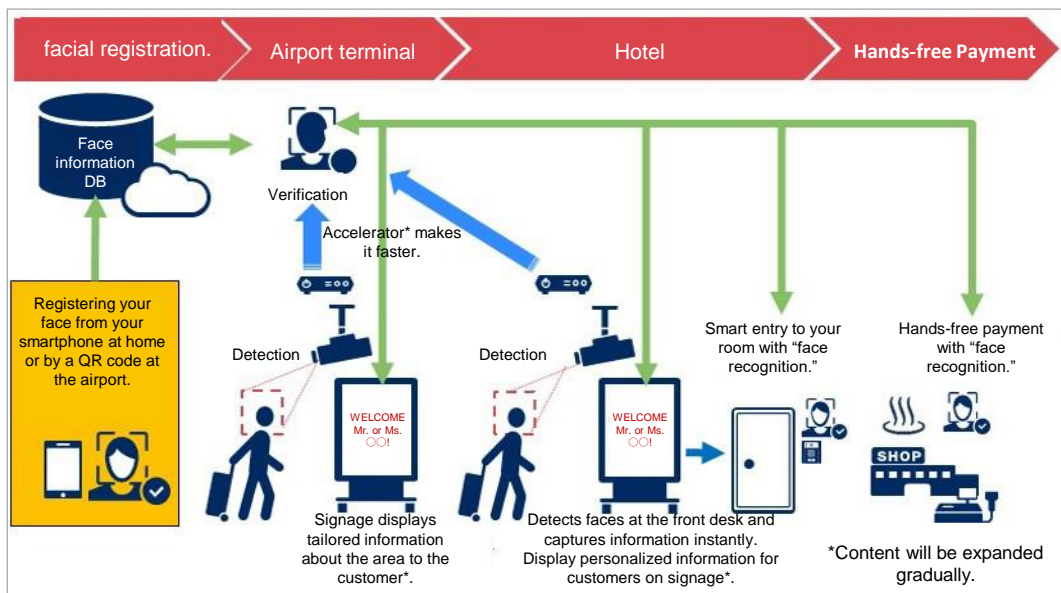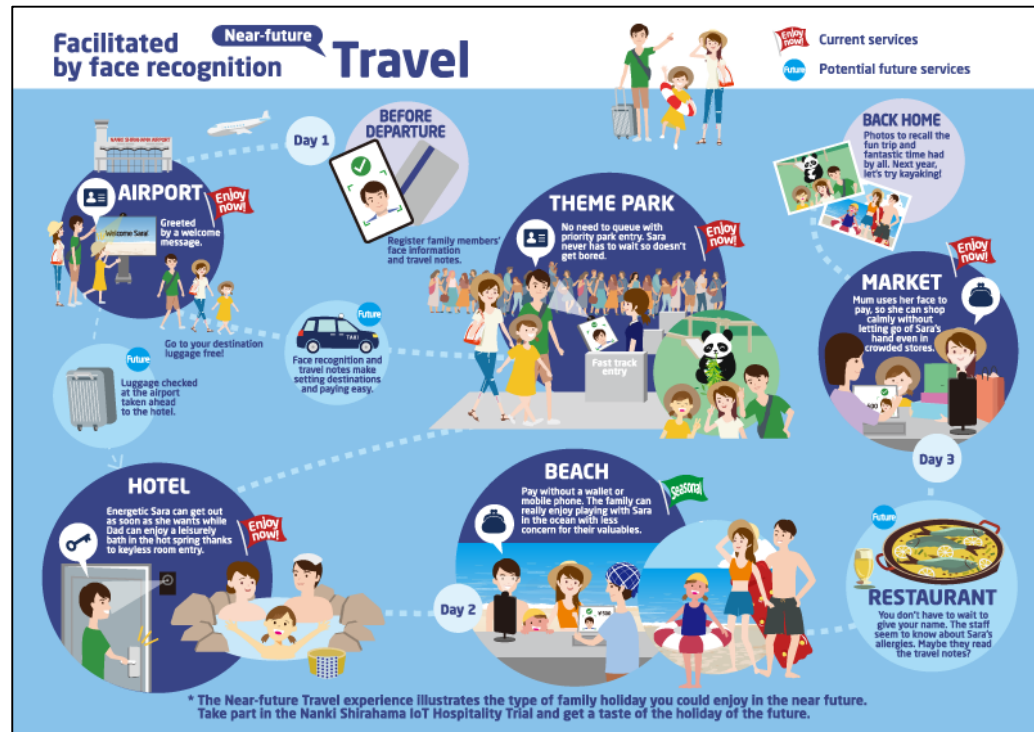
Your face can serve as your wallet at various locations along the route. And your face also becomes your key at hotel.

Utsunomiya Smart City Model Promotion Plan (Utsunomiya City)

Realizing clean "Regional Symbiosis Smart City※" where anyone can move freely and live with convenience and happiness through "mobility (AI operation, etc.) x hospitality (biometric authentication, etc.) x energy (new regional electric power, etc.)," centered on Japan's first entirely new railroad track system, LRT (Light Rail Transit).

Information and communications technology (ICT) supports the activities of people and goods, improving the convenience of everyday life for citizens in various fields and creating a vibrant city.
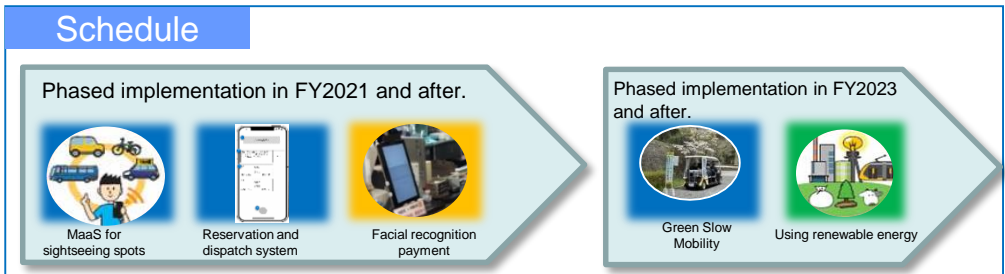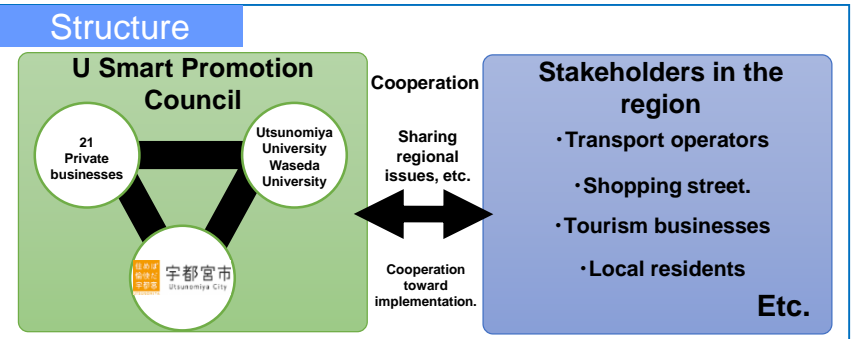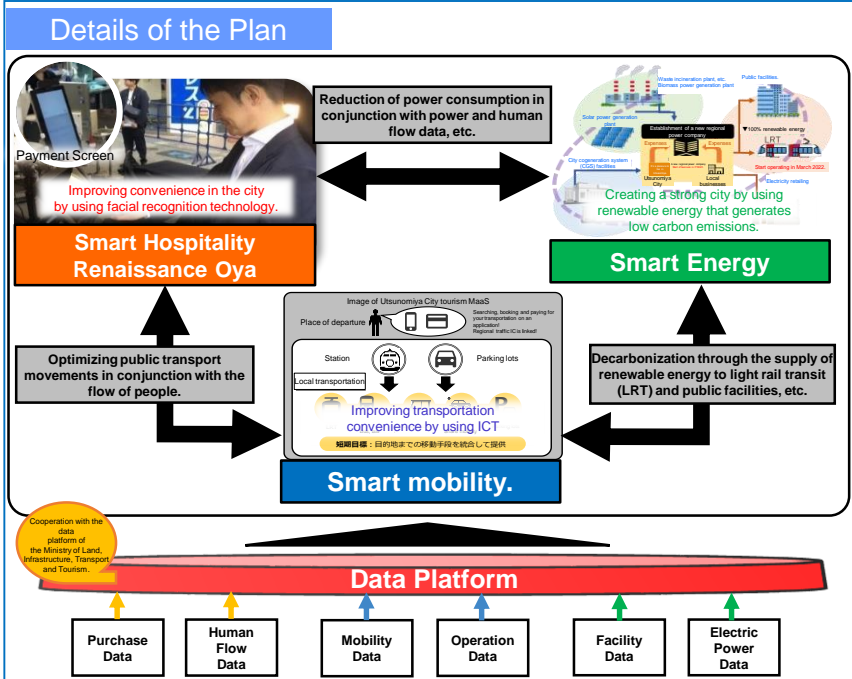
Goals

Average time spent by tourists: 4.3 hours (current) →5 hours (FY2022)
The number of inbound tourists in the Oya district: 770,000 per year (current) →930,000 per year (FY2022).
The number of public transportation users【current】33.51 million/year (current) → 35 million/year (FY2022)
Reduction in CO2 emissions from locally-consumed and locally-produced renewable energy 0 (current) → 7,800t-CO2/year (FY2022)

Details of the Plan

Payment Screen

Improving convenience in the city by using facial recognition technology.

Smart Hospitality Renaissance Oya

Reduction of power consumption in conjunction with power and human flow data, etc.

Creating a strong city by using renewable energy that generates low carbon emissions.

Smart Energy

Optimizing public transport movements in conjunction with the flow of people.

Image of Utsunomiya City tourism MaaS
Place of departure
Searching, booking and paying for your transportation on an application!
Regional traffic ICs linked!
Station
Local transportation
Parking lots

Improving transportation convenience by using ICT

短期目標：目的地までの移動手段を統合して提供

Decarbonization through the supply of renewable energy to light rail transit (LRT) and public facilities, etc.

Smart mobility.

Cooperation with the data platform of the Ministry of Land, Infrastructure, Transport and Tourism.

Data Platform

| Purchase Data | Human Flow Data | Mobility Data | Operation Data | Facility Data | Electric Power Data |

Future Image

Enhancing disaster response capability through the use of solar power generation, EVs and storage batteries.

Improving people's mobility in Oya area through tourism-type MaaS, etc.

Facilitating mobility through the introduction of MaaS across the entire Utsunomiya area.

Enriching hospitality through signage and facial recognition.

Improving the mobility environment by combining various modes of transportation.

Zero carbon emissions from eco-friendly mobility, etc.

Structure

U Smart Promotion Council

21 Private businesses

Utsunomiya University Waseda University

宇都宮市 Utsunomiya City

Cooperation

Sharing regional issues, etc.

Cooperation toward implementation.

Stakeholders in the region
・Transport operators
・Shopping street.
・Tourism businesses
・Local residents
Etc.

Schedule

Phased implementation in FY2021 and after.

MaaS for sightseeing spots

Reservation and dispatch system

Facial recognition payment

Phased implementation in FY2023 and after.

Green Slow Mobility

Using renewable energy

Data Circulation SMARTCITY Action Plan spearheaded by "VIRTUAL SHIZUOKA" (Shizuoka Prefecture)

Aiming to create a safe, secure, convenient, and comfortable city for everyone by utilizing "VIRTUAL SHIZUOKA," which is created with 3D point cloud data, in every field.

Goals

- Improvement in life satisfaction and ease of living index: 10% increase for those in their 60s and older.
- Increase in the number of tourists through VR content.
- 20% reduction in the number of road closures during a disaster.
- Raising awareness through disaster prevention drills using VR.
- ※ Quantitative targets will be set and improved based on data to be acquired in the future.

Details of the Plan

Automated driving in conjunction with MaaS

Station — Searching, booking and payment

Buses on regular routes, On-demand transport, Rental car, Rental bicycle, Automated Driving

Secondary transportation reservation payment application

Tourist facilities, Lodging facilities

Outline of collaboration with Izu tourism model MaaS.

Utilizing a high-resolution 3D digital map created from 3D point cloud data.

[Local transport + Tourist transport]
Realizing a comfortable mobility alternative to private cars.

Shimoda Medical Center — 1.2km — Izukyu Shimoda Station — 1.7km — Roadside station

Using VR in tourism policy.

- Experiencing the attractiveness of VR content that uses 3D point cloud data, which is not affected by time, weather, or disability.
- Verifying the effectiveness of virtual tour by installing VR at the Izu Peninsula Geopark Museum (Georia).
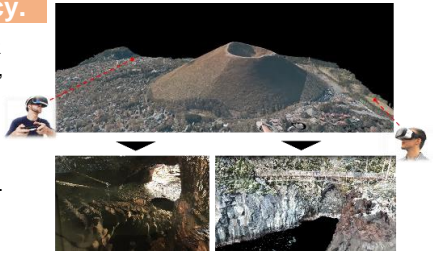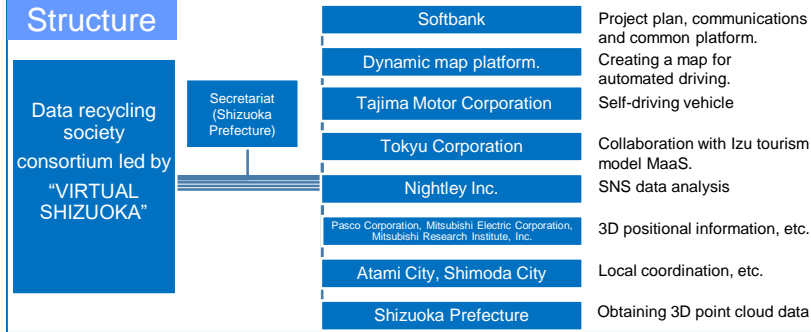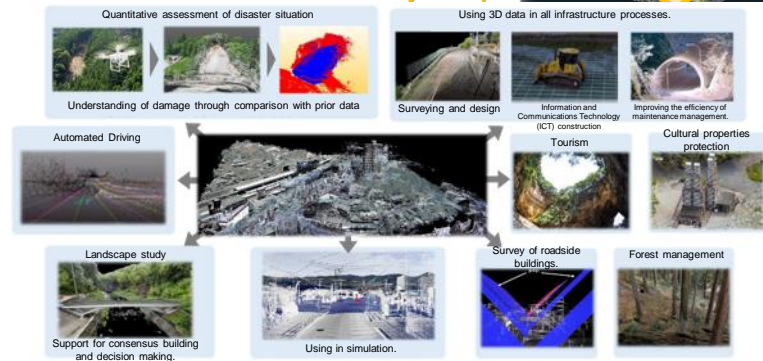

Future Image

VIRTUAL SHIZUOKA initiative

Aiming to create an efficient and effective data-circulating smart city by "sharing and utilizing" 3D point cloud data in all fields including infrastructure maintenance and management, automated driving, tourism, disaster prevention and disaster reduction, and linking it with various databases.
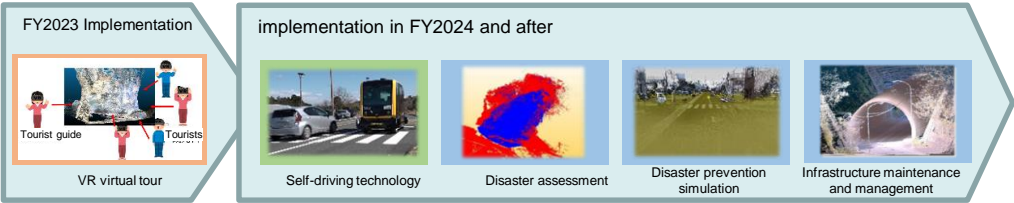
Cyberspace (Virtual)

Physical space (Reality)

3-Dimensionality of the prefectural soil. → Utilizing data in every field.

Quantitative assessment of disaster situation — Understanding of damage through comparison with prior data

Using 3D data in all infrastructure processes. — Surveying and design — Information and Communications Technology (ICT) construction — Improving the efficiency of maintenance management.

Automated Driving — Tourism — Cultural properties protection

Landscape study — Support for consensus building and decision making. — Using in simulation. — Survey of roadside buildings. — Forest management

Structure

Data recycling society consortium led by "VIRTUAL SHIZUOKA" — Secretariat (Shizuoka Prefecture)

Organization	Role
Softbank	Project plan, communications and common platform.
Dynamic map platform.	Creating a map for automated driving.
Tajima Motor Corporation	Self-driving vehicle
Tokyu Corporation	Collaboration with Izu tourism model MaaS.
Nightley Inc.	SNS data analysis
Pasco Corporation, Mitsubishi Electric Corporation, Mitsubishi Research Institute, Inc.	3D positional information, etc.
Atami City, Shimoda City	Local coordination, etc.
Shizuoka Prefecture	Obtaining 3D point cloud data

Schedule

FY2023 Implementation

Tourist guide / Tourists
VR virtual tour

implementation in FY2024 and after

Self-driving technology — Disaster assessment — Disaster prevention simulation — Infrastructure maintenance and management

⑧ Asset management and ensuring long-life and reliable infrastructure

Concept: Reducing the lifecycle cost of infrastructure by utilizing data based on reality.

Issues of Urban Cities and Goals

《Issues》
- Robust maintenance of basic infrastructure that supports people's daily lives.
- Addressing the unpredictability and difficulty of predicting the scale and location of infrastructure where an accident may occur.

《Goals》
- Maintaining infrastructure that can provide safety and security for residents while reducing the costs and risks of basic infrastructure management.
- Realizing planned basic infrastructure investments.
- Providing a safe and secure environment for residents including prompt recovery from a disaster by utilizing data.

Japan's Solutions

- Grasping and managing road surface conditions using data from accelerometers and vehicle-mounted cameras.
- Prioritized repair of heavily trafficked roads by using a combination of deterioration detection data based on AI-processed image data and human flow analysis data.
- Using the difference of three-dimensional point group data to grasp changes over time for the maintenance and management of roads and rivers.
- Highly accurate damage/leakage prediction using AI/machine learning for water pipes (Note: Tests are also being conducted on gas pipes).
- Calculation of the amount of accident risk taking into account the surrounding circumstances.

Predictive diagnostic system offered by Fracta
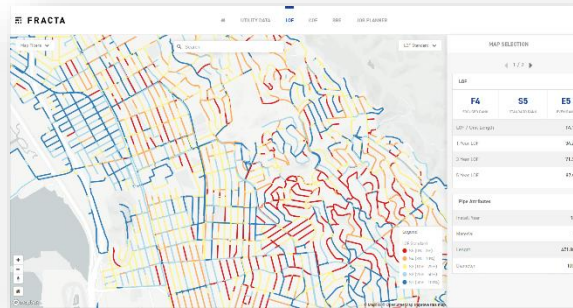
- Highly accurate prediction of the deterioration of underground water pipes without conducting direct physical inspection. Software that enables the optimization of investment in the replacement of water pipes by calculating "water leak probability."
- Establishing own environmental database including over 1,000 environment variables.
- The probability of leakage of each pipe is calculated and mapped by color coding from blue (safe) to red (dangerous) (see drawing on left).
- In the U.S., more than 60 water utilities in 27 states have already introduced the system.

Source: Created based on information provided by Fracta.

| Places visited for on-site inspection	• Masuda City, Shimane Prefecture • Fujieda City, Shizuoka Prefecture • Atami City, Shimoda City, Shizuoka Prefecture • Kobe City, Hyogo Prefecture
Participating Companies Main Operators	• Masuda City, Masuda Cyber Smart City Creative Consortium • Fujieda City, Shizuoka Prefecture, Fujieda ICT Consortium • Shizuoka Prefecture, Softbank Corp. • Fracta

Diagnosis of infrastructure degradation through AI/machine learning (Fracta)

- Fracta is an AI venture company* founded in the U.S. by a Japanese entrepreneur. Providing solutions that optimize water pipe replacement investment and asset management by using AI/machine learning to predict leaks with high accuracy. Developing a business in the U.S. where aging water pipes have become a social problem, and currently operating more than 60 entities in 27 states.

- In Japan, implementing verification tests with six entities (the Kobe City Waterworks Bureau, Kanagawa Corporate Bureau, Kawasaki City Waterworks Bureau, Osaka City Waterworks Bureau, and other entities), aiming to put the diagnosis of water pipe deterioration to practical use; thus, expanding business in a full-fledged manner. Planning to introduce the system to 100 business units by the end of 2022.

※ In 2018, Fracta became part of Kurita Water Industries Ltd., a leading water treatment company.

Details of the demonstration in Kobe City
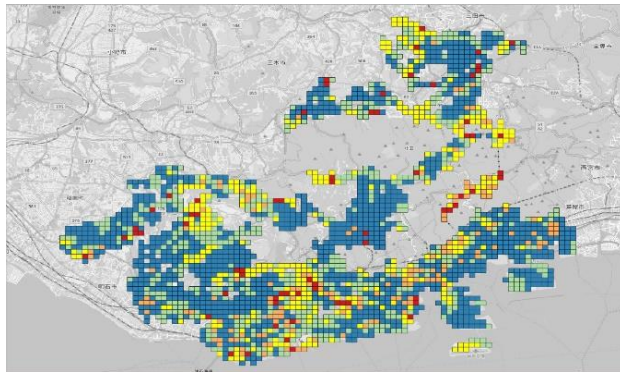
Leakage prediction for 2014-2018

① Using leakage records from stored materials for more than decade in the past as learning data. Using AI/machine learning to predict leaks in the coming 5 years and displaying the risk level as a heat map.

Results of comparison with actual leak/damage history.
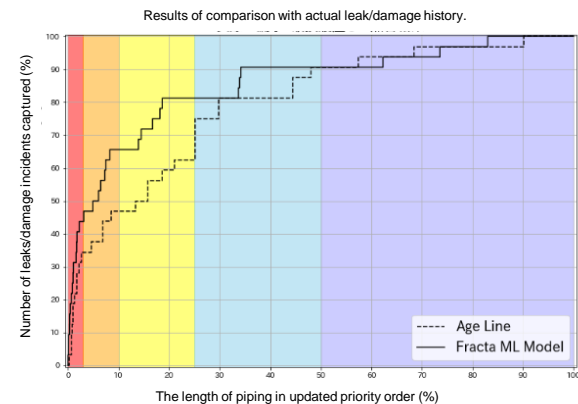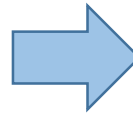
Results of comparison with the actual leakage history.

② Compared actual leakage history with the prediction over the same period.
The Fracta prediction was found to be more accurate and useful as a deterioration diagnosis than the aging criteria.

Source: Created based on information provided by Fracta.

Masuda City, Masuda Cyber Smart City Action Plan (Masuda City)

Realizing administrative cost reduction and creating an attractive region through infrastructure maintenance and management,
monitoring support, and medical and health care support by constructing an IoT backbone infrastructure using city-owned optical cables.

Goals

- Reduction in infrastructure maintenance costs by 20% or more through the use of IoT (2023)
- Convenience Improvement net promoter score (NPS) from an administrative perspective 50% (2023)
- Gross regional product per employee more than 10% (2023)

Details of the Plan

Infrastructure Maintenance and Management

- Monitoring the water level of small rivers on a real-time basis and using it for disaster prevention and infrastructure management.
- Efficient maintenance and management by collecting data through road monitoring by camera-equipped patrol cars, which are analyzed by AI.
- Checking wildlife damage by electric fence sensing and resolving labor shortage

Monitoring support

- Monitoring vulnerable people by acquiring the location information of the elderly by tags, etc., and the vital data of infants and toddlers.

Healthcare・

- Extending healthy life expectancy and reducing medical costs by consolidating and analyzing the results of monitoring through sphygmomanometer, etc., connected to network.
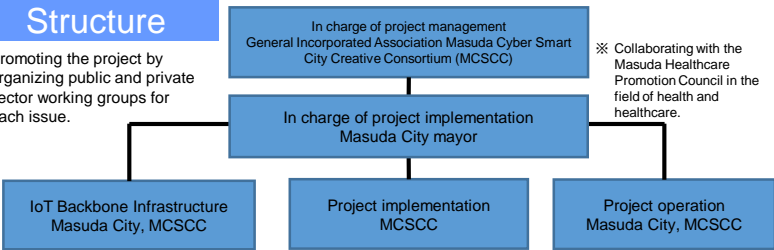
IoT Backbone Infrastructure

- Combining a municipal fiber-optic and LPWA network to operate IoT infrastructure at low cost and improving city finances by utilizing the private sector.

Future Image

Maintenance and Management (Road monitoring)

Maintenance and Management (water level monitoring)

Monitoring support (Watching over the elderly and infants)

Healthcare/Health

Maintenance and Management (Farmland Management)

IoT Backbone Infrastructure (fiber-optic network LPWA)

Structure

Promoting the project by organizing public and private sector working groups for each issue.

In charge of project management
General Incorporated Association Masuda Cyber Smart City Creative Consortium (MCSCC)

※ Collaborating with the Masuda Healthcare Promotion Council in the field of health and healthcare.

In charge of project implementation
Masuda City mayor

IoT Backbone Infrastructure
Masuda City, MCSCC

Project implementation
MCSCC

Project operation
Masuda City, MCSCC
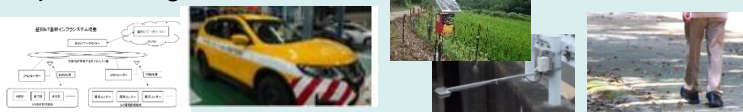
Schedule

Implementation

Healthcare/Health

Implementing in 2022

IoT Backbone Infrastructure

Road monitoring

Water level, wildlife damage Monitoring

Monitoring

Fujieda Smart Compact City Action Plan (Fujieda City, Shizuoka Prefecture)

Realizing a smart compact city by providing services that utilize advanced technologies to improve convenience for citizens and creating an urban operating system for data utilization.
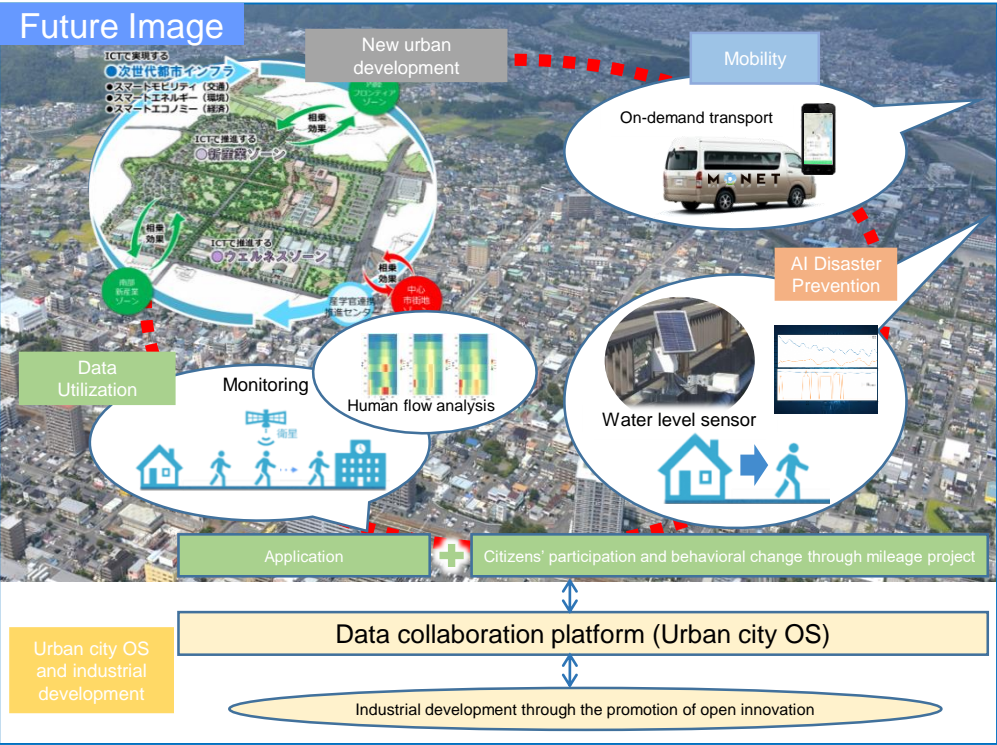
Goals

- The number of UIJ-turned people aged 25 to 29 years old   Increase by 100 (2029)
- The number of people in child-rearing generation moving into the city   Increase by 250 (2029)
- The number of people living in towns   Increase by 1,000 (2029)
- Regional experience seekers   Increase by 500 (2029)

Details of the Plan

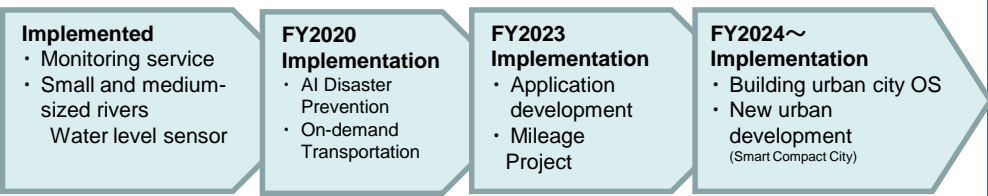| AI Disaster Prevention	Ensuring the safety of citizens by monitoring water levels of small and medium-sized rivers and advising early evacuation through danger prediction using AI
Mobility	Connecting suburban and low uplands areas with central city and commercial facilities through AI-based on-demand transportation.
Data Utilization	Promoting 4K (health, education, environment, and risk management) policies and urban planning in Fujieda City based on data evidence by utilizing data from citizen-oriented applications, public transportation services, and mileage awards for city walks to promote citizen participation and behavioral change.
Urban city OS and industrial development	Promoting the development of an urban operating system as a data-connected infrastructure and open innovation to promote corporate location
New Urban development	Implementing the development of urban infrastructure to create a smart and compact city integrated with the city center.

Future Image

Data collaboration platform (Urban city OS)

Industrial development through the promotion of open innovation

Structure

Initiatives		Main implementer (Fujieda City participates in the whole project)
AI Disaster Prevention	Water level monitoring	e TRUST Co., Ltd.
	AI prediction	Softbank Corporation
Mobility		MONET Technologies Inc. Public transport operator
Data Utilization	Application development	Fujieda ICT Consortium
	Mileage project	Fujieda City
Urban city OS and industrial development		Fujieda ICT Consortium, Fujieda City
New urban development		Fujieda City

Schedule

Implemented	FY2020 Implementation	FY2023 Implementation	FY2024～ Implementation
・Monitoring service ・Small and medium-sized rivers Water level sensor	・AI Disaster Prevention ・On-demand Transportation	・Application development ・Mileage Project	・Building urban city OS ・New urban development (Smart Compact City)

⑨ Agricultural production and distribution bases that ensure safety and high quality

Concept: Initiatives toward social implementation of Smart Agriculture technologies such as robotics, AI and IoT, etc.

Issues and Goals

《Issues》

■ Labor shortage due to decrease in the number of business farmers and aging of farming population.

■ Need for further value addition and productivity improvement in preparation for expected market shrinkage due to population decline.

《Goals》

Solving issues by introducing advanced technologies such as robotics, AI and IoT in the field of agricultural production (smart agriculture).

■ Work Automation.
■ Simplified information sharing.
■ Data utilization.

Japan's Solutions

■ Agricultural Data Collaboration Platform (WAGRI)

• A platform that supports smart farming from a data perspective. Linking data from production to processing, distribution, consumption and export.

Data linking function

Data sharing function

Data provision function

WAGRI

WAGRI

WAGRI
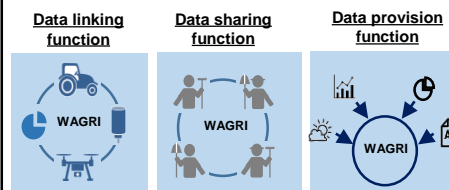
**Three functions of the Agricultural Data Collaboration Platform**

■ Work Automation

• Advanced technologies such as robotic tractors, etc., enable farmers to expand the scale of production.

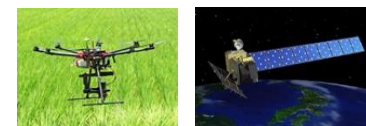Two robotic tractors, manned and unmanned, working in collaboration

■ Succession of farming skills and management

• Digitizing farm management with ICT and making farming more efficient by hiring new people.

Sharing → Farmers
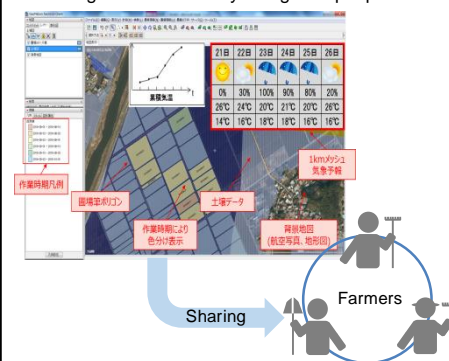
■ Data utilization

• Using remote sensing data, etc., to predict the growth of crops, which achieves advanced agricultural management.

Cultivated field sensing using drones and satellites

Cultivated field sensing

Places visited for on-site inspection

• Nitta farm, Iwamizawa City, Hokkaido
(Representative organization: Research Faculty of Agriculture, Hokkaido University)

Participating companies and main operators

• Smart Link Hokkaido Inc.

Revitalization of local rice paddy farming by introducing smart farming technology (Iwamizawa City, Hokkaido)

Examples of the project

① Grasping regional growth conditions by building a sensor network and remote sensing analysis.
② Reducing labor hours and implementing variable-rate fertilization by introducing robotic tractors and automatic water valves, etc.
③ Collecting and consolidating sensing information on each farm and operating information of farm machinery (including robots) to estimate input costs for each farm and to secure excess labor for the introduction of other crops.
④ Planning for domestic and international crop sales based on a detailed analysis of production costs.
⑤ Sharing agricultural machinery and farming know-how within the group.

Toward an advanced model of regional implementation of smart agriculture in large paddy fields.

Goals

○ Aiming to reduce rice production costs by 50% (8,000 yen/60kg) and increase farmer's income by 20%, which exceeds the government's target of reducing rice production costs by 40% (9,600 yen/60kg) from the national average for 2011.

Overview of the technology system to be demonstrated

Underlying technology	① Robotic tractor (plowing, soil preparation), ② Variable-rate spraying (fertilizer application, sowing, additional fertilizer, and pest control), ③ Water management (automatic water supply valve and paddy field water temperature sensor), ④ Robotic combine (harvest), ⑤ Remote sensing, ⑥ Information provision function for producers, etc.

Time	April	May	June	July	August	September	October	November	December	January	February	March
"Inspection!" Time			①	②	③ ⑤	⑥	④ ① ②					

① Robotic tractor (Yanmar Holdings Co., Ltd., Kubota Corporation)	② Variable spraying (Iseki Hokkaido)	③ Water management (Kubota ChemiX Co., Ltd., AmaterZ Inc.)	④ Robotic combine (Kubota Corporation)	⑤ Information acquisition and analysis by remote sensing	⑥ Information provision function for producers, etc.

automatic water supply valve

Water temperature, water level sensor