Japan Can Offer Various Solutions (Cases and Examples)
Data-driven smart cities

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.

Details of the Plan

**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.

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

**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 citizens including wide-area TV information.

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

**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.
- Development of the "Daimaruyu" version of the Urban OS
- Services and New Applications throughout areas
- Collaboration between ministries and public/private sectors
- Implementation of service applications and accessibility services, etc., for MICE applications, etc.
- Implementation of service applications and accessibility services, etc., for MICE applications, etc.

**Structure**

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

**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.

**Future Image**

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

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

Real Daimaruyu
(Otemachi, Marunouchi and Yurakucho)

Redesign Group of Area Management

Digital Daimaruyu

Redesign Plan

Implementing Redesign

Digital Daimaruyu

Data Collection

Simulation

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

Schedule

Implementing in 2020

Creating a comfortable space and disseminating space information.

Use of Robots

Expanding and linking areas and contents

Implementing around 2022

Health applications

Disaster Response

Sequentially expand and link implementation and contents by around 2023 to 2025.

Economic benefits from the use of data: 64.5 billion yen per year (FY2025)
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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.
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

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

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)

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.).

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.

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.

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.
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.

Goals
- 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 a station at the center.

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

Data Platform
- (Public sector data platform) Kashiwa City, NEC Corporation.

Mobility
- 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.

Energy

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.

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.

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### Contents of Services

#### Mobility Market
- For example, a commuter bus lane on weekday mornings becomes a farmer’s market on weekends.

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

#### Smart Home Energy
- Displaying the remaining capacity of solar power and storage batteries, operation of electric appliances and necessary shopping are completed by talking to AI speakers.

#### Healthcare
- 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.

#### Security and Safety
- 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.

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

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### 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

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### 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.
Providing web-based educational programs that allow residents to learn based on their individual interests.

Carrying out follow-up study in line with the learning log and history.

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.

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.

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.

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.
### 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.

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**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
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

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

(2) Safe and secure infrastructure Integrated data platform.

- Planning the adoption of cloud system and data collaboration.
- Composed with FIWARE as the center.
- Open API for data utilization.

(3) Multi-field data utilization

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

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.

Improving the convenience of regional public transportation

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

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...
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.**

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### Las Vegas Public Safety Solution

- **Real time detection** (person, vehicle and unusual sound, etc.)
- **Advanced analysis**
  - Multi-sensor analysis
  - Prediction of number of people

### Areas to be monitored
- 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.

### Las Vegas City Control Center
- What is happening now?
- What will happen from now on?

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**Reducing response time**
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.

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
- Smart Wellness City Council (Sapporo)
- Tsukuba Smart City Council
- Kozoji Smart City Promotion Study Group (Kasugai 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.
- Using a smartphone 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.

**Walkable Urban development**

- Creating a town that makes people want to walk and ensuring efficient snow removal.

**Citizen Participation and Behavioral Change**

- Encouraging behavioral change through incentives such as health and wellness points, etc.

**Area Management**

- Using a smartphone 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.

**Future Image**

- Promoting excursions by providing information on events, etc., through applications and signage
- Efficient snow removal by Smart Snow
- Developing spaces that make people want to walk through smart planning
- Promoting the use of public transportation through health and wellness points.

**Schedule**

- Implementing in 2021 (part of region)
- Implementing in 2022

**Administration**

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

**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)

**Relevant Organizations**

- **Sapporo City Center Data Platform Utilization Consortium.**
- **Sapporo Area Regional Data (SARD)**

**Experts**

- **University of Tsukuba Professor Hisano** (Policy guidance)
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 on 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

Encouraging the elderly to go out using facial recognition
Mobility services using facial recognition technology
Mobility support for people with difficulty traveling

Schedule

~FY2021 Implementation
- On-site demonstration of measures to prevent traffic congestion.
- Considering an appropriate operation schedule, etc.
- Providing a safe and secure means of transportation for the last mile.

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.

Structure

Tsukuba Smart City Council
- Secretariat
- Ibaraki Prefecture
  - Taikoba City
  - University of Tsukuba

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
Kanto Railway Co., Ltd.
University of Tsukuba
Tsukuba City
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.
- 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.

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.

Future Image (Ishiodai District)

Garbage truck operation management
- Parking lot management
- Security monitoring system in the region
- Garbage truck operation management

NT version MaaS that supports mobility
- Legible and accessible town
- NT version MaaS
- Sustainable and viable city
- Realizing Kozoji New Mobility Town Action

Key transportation
- Kozoji Station

Schedule

FY2020 Implementation
- Shared taxi

FY2021 Implementation
- Last mile self-driving

Phased implementation in FY2023 and after※
- Parking lot management, etc.

※ Adjustments are made based on the results of demonstration tests, etc.
 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 CO2 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 CO2, 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 CO2 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
- 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 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**

**Using locally produced renewable energy, etc.**

Reducing greenhouse gas emissions through a decentralized and self-reliant energy system that utilizes locally produced resources including solar power generation equipment and solar thermal equipment.

**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.”

**Improving resilience against natural disasters, etc.**

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

↑ Hot water was supplied during a power outage.

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

**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.

**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.

**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.
Environment sensing
Temperature distribution sensing

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.

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.

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

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.

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.

Voluntary mutual resource recycling among companies in an eco-town.

Places visited for on-site inspection
- Kitakyushu City in Fukuoka Prefecture

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)
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**

**General environmental complex/Hibiki Recycling Area**

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

- Educational 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 CO₂**

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

**Recycling Industry and job creation**

- In addition to the direct investment through the development of facilities and business operations as well as the employment benefit of over 1,000 people, 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.

**Summary of 2016 survey results**

- **CO₂ reduction through recycling**: ▲ 433,000 tons/year
- **CO₂ emissions from recycling process**: ▼ 78,000 tons/year
- **Environmental burden reduction effect (CO₂ reduction)**
  - FY2010: ▲ 400,000 tons/year
  - FY2005: ▲ 304,000 tons/year
  - Number of projects surveyed: 22

**Reference: Past survey results**

- FY2010: ▲ 400,000 tons/year
- FY2005: ▲ 304,000 tons/year
- Number of projects surveyed: 14
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.
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.
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]**

![Image of a chart showing the number of Johkasou exported yearly from 2004 to 2019.](chart.png)

**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**

- 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**

- 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**

- 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**

- 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).
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.

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

- **Reducing final disposal volume**
  - 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**
  - Contributing to the preservation of the living environment and the improvement of public health through the proper waste management.

- 4,700 tCO2/year
- 60 ton/day
- Extending the life of final disposal site.
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.

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.

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.
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.

**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.

By using the cloud technology, possible to communicate with SNS while sharing images with smartphones or tablets.
[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**
  - High operability
    - Continuous flight for several months is possible
    - Can perform fixed point turning at any coordinates
  - Disaster resistance
    - Not susceptible to natural disasters
  - 3D area
    - Providing a stable LTE/5G* area for drones, etc.
  - Ultra-wide LTE/5G* coverage
    - One machine covers 300 km in diameter

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 several 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.

*(Example: Supporting the building of telemedicine system)*

Improving “Internet Connectivity” (Strengthening digital infrastructure)
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

- 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.

 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.

 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.

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

Academic support by using ICT while schools are temporarily closed.

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.

Further enrichment of learning activities
Improved lessons from the perspective of proactive, interactive and authentic learning

Past practices × ICT =

Before “1 computer per student”

<table>
<thead>
<tr>
<th>Group Learning</th>
<th>Deepen Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher can motivate children by using electronic blackboard, etc.</td>
<td></td>
</tr>
</tbody>
</table>

With “1 computer per student”

<table>
<thead>
<tr>
<th>Group Learning</th>
<th>Convert Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each student can learn different content at the same time.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Joint Learning</th>
<th>Expected Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group presentations can be made, but it’s hard for quieter students to voice their unique opinions.</td>
<td></td>
</tr>
</tbody>
</table>

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

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

### Expected Effects

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

**COIL** Collaborative Online International Learning

Local business, 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

- 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) Shirahama Town, Wakayama Prefecture
- In addition to providing 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) Otsu City and Mount Hiei 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.)

- 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
- NEC Corporation (NEC)
- U Smart Council (Utsunomiya City)
- Shizuoka Prefecture, Softbank Corp.

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.

(This demonstration experiment was conducted by NEC, etc., who received a NEDO research grant for the "Implementation of an Architecture Demonstration Study on Inter-Company Linkage of Biometric Data," which is a research and development item in the "Personal Data Field" of the Cabinet Office’s "Cross-ministerial Strategic Innovation Promotion Program (SIP) Term 2/Big-Data and AI-Enabled Cyberspace Technologies").
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.

Details of the Plan

- Smart Hospitality Renaissance Oya
  - Improving convenience in the city by using facial recognition technology.
- Smart Energy
  - Decarbonization through the supply of renewable energy to light rail transit (LRT) and public facilities, etc.
  - Optimizing public transport movements in conjunction with the flow of people.

Future Image

- Improving people’s mobility in the Oya area through tourism-type MaaS etc.
- Creating a strong city by using renewable energy that generates low carbon emissions.

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 (current): 0 → 7,800t-CO2/year (FY2022)

Utsunomiya Smart City Model Promotion Plan (Utsunomiya City)
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.

**Goal**
- Improvement in life satisfaction and ease of living index: 10% increase for those in their 60s and older.
- 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
- On-demand transport
- Ride-sharing
- Rent bicycle
- Automated Driving

Outline of collaboration with Izu tourism model MaaS.

**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.

**Structure**

Data recycling society consortium led by “VIRTUAL SHIZUOKA”

- Secretariat (Shizuoka Prefecture)
- Softbank
- Dynamic map platform
- Tajima Motor Corporation
- Tokyo Corporation
- Nightley Inc.
- Pasco Corporation, Mitsubishi Electric Corporation, Mitsubishi Research Institute, Inc.
- Atami City, Shimoda City
- Shizuoka Prefecture

Project plan, communications and common platform.
- Creating a map for automated driving.
- Self-driving vehicle
- Collaboration with Izu tourism model MaaS.
- SNS data analysis
- 3D positional information, etc.
- Local coordination, etc.
- Obtaining 3D point cloud data

**Schedule**

FY2023 Implementation
- Implementation in FY2024 and after

**Cyberspace (Virtual)**

Physical space (Reality)

- Quantitative assessment of disaster situation
- Using 3D data in all infrastructure processes.
- Understanding of damage through comparison with prior data
- Surveying and design
- Using in simulation
- Survey of roadside buildings
- Forest management
- Cultural properties protection
- Automated Driving
- Support for consensus building and decision making
- Tourist facilities
- Lodging facilities
- Rental car
- Rental bicycle
- Secondary transportation reservation payment application
- Searching, booking and payment
- Buses on regular routes
- On-demand transport
- Ride-sharing
- Rent bicycle
- Automated Driving

**3-Dimensionality of the Prefectural Soil**

Utilizing data in every field.
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.

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
- Masuda City, Masuda Cyber Smart City Creative Consortium
- Fujieda City, Shizuoka Prefecture, Fujieda ICT Consortium
- Shizuoka Prefecture, Softbank Corp.
- Fracta

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.
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

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.

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

**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.

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

**Healthcare**
- Monitoring support (Watching over the elderly and infants)
- Monitoring the water level of small rivers on a real-time basis and using it for disaster prevention and infrastructure management.
- Checking wildlife damage by electric fence sensing and resolving labor shortage.

**Future Image**

**Maintenance and Management (Road monitoring)**

**Maintenance and Management (Farmland Management)**

**Efficient maintenance and management by collecting data through road monitoring by camera-equipped patrol cars, which are analyzed by AI.**

**Combining with the Masuda Healthcare Promotion Council in the field of health and healthcare.**

**Implementing in 2022**
- IoT Backbone Infrastructure
- Road monitoring
- Water level, wildlife damage Monitoring
- Monitoring

**Schedule**
- Implementation
- Structure
- In charge of project management
  General Incorporated Association Masuda Cyber Smart City Creative Consortium (MCSCC)
- In charge of project implementation
  Masuda City mayor
- Project implementation
  MCSCC
- Project operation
  Masuda City, MCSCC

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

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Main Implementer</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI Disaster Prevention</td>
<td>e TRUST Co., Ltd.</td>
</tr>
<tr>
<td>AI prediction</td>
<td>Softbank Corporation</td>
</tr>
<tr>
<td>Mobility</td>
<td>MONET Technologies Inc. Public transport operator</td>
</tr>
<tr>
<td>Data Utilization</td>
<td>Fujieda ICT Consortium</td>
</tr>
<tr>
<td>Application development</td>
<td>Fujieda City</td>
</tr>
<tr>
<td>Mileage project</td>
<td>Fujieda City</td>
</tr>
<tr>
<td>Urban city OS and industrial development</td>
<td>Fujieda ICT Consortium, Fujieda City</td>
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<tr>
<td>New urban development</td>
<td>Fujieda City</td>
</tr>
</tbody>
</table>

Future Image

- On-demand transport
- AI Disaster Prevention
- Urban city OS and industrial development
- Mobility

Implemented
- Monitoring service
- Small and medium-sized rivers

Data Utilization
- Application development
- Mileage Project

Schedule

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<tr>
<th>Implementation</th>
<th>FY2020</th>
<th>FY2023</th>
<th>FY2024~</th>
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<tbody>
<tr>
<td>AI Disaster Prevention</td>
<td>Monitoring service</td>
<td>AI Disaster Prevention</td>
<td>Building urban city OS</td>
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<td>Mobility</td>
<td>On-demand Transportation</td>
<td>Mileage Project</td>
<td>New urban development</td>
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<tr>
<td>Data Utilization</td>
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<td>(Smart Compact City)</td>
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<td>Urban city OS and industrial development</td>
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<td>New urban development</td>
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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.

  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.

- **Succession of farming skills and management**
  - Digitizing farm management with ICT and making farming more efficient by hiring new people.

- **Data utilization**
  - Using remote sensing data, etc., to predict the growth of crops, which achieves advanced agricultural management.

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)

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.

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.

Overview of the technology system to be demonstrated

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

Time

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<th>April</th>
<th>May</th>
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"Inspection!" Time

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