Separate Volume ①
Main Services Introduced Through Smart City

Main Services Introduced Through Smart City

- Initiatives to realize smart cities that leverage new technologies and data have begun throughout Japan, and many services are being born through smart cities.
- Services will be introduced by field of initiatives so that cities and regions can consider the introduction of smart cities by referring to precedents according to the challenges they face.

■ Examples of domestic initiatives

Transportation / Mobility
Aiming to improve the comfort and speed of people's travel and transportation of goods, or to omit them

Agriculture, Forestry and Fisheries
Aiming to maintain and revitalize the agriculture, forestry and fisheries industry

Disaster Prevention
Aiming to minimize the scale of damage as much as possible by strengthening countermeasures and response to natural disasters, infectious diseases etc.

Environment / Energy
Aiming for a sustainable society by reducing energy consumption and promoting renewable energy

Infrastructure Maintenance and Management
Aiming to improve the efficiency of maintenance and management of infrastructure that forms the basis of daily life, and to enhance its functions

Security / Monitoring
Aiming to create a safe and secure environment for citizens by reinforcing crime prevention and facilities to watch over protected persons etc.

Tourism / Regional Revitalization
Aiming to revitalize tourism projects and bustling areas and facilities in the region

Urban Planning and Development
Aiming to effectively maintain and utilize information within the region that is accessible to citizens

Health / Medical Care
Aiming to expand inclusive health care systems and promote routine health care

Logistics
Aiming to combine various means of transportation to increase speed, reduce costs and simplify procedures

Future Realized by Smart Cities: Transportation and Mobility

Issues faced by region

- ✓ Reduce traffic congestion in urban centers and tourist areas due to concentration of private vehicles
- ✓ Ensure public transportation in areas around cities and underpopulated areas
- ✓ Concerns about labor shortages in the transportation industry

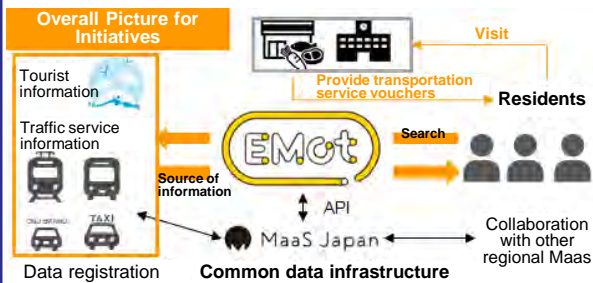## Illustration of Future Realized by Smart Cities: Transportation and Mobility

- ○ **Optimize citizen mobility** using location data and traffic observation data. **Improve the added value of the mobility experience**.
- ○ Through the use of automated driving etc., **congestion relief** in urban areas and tourist destinations, and **eliminate no public transportation service zones** in mountainous areas.
- ○ **Ensure that public transportation services are sustainable** even if the shortage of transportation operators becomes severe in the future.

Movement optimization

Location information

Traffic observation data

Sustainable public transportation services

Wi-Fi

Congestion relief

Elimination of no public transportation service zones

Future Realized by Smart Cities: Transportation and Mobility examples

Shin Yuri MaaS (Kawasaki City)

In addition to search and arrangement of various means of transportation such as railroads, buses, on-demand transportation and cabs through the application, provide services such as real-time train operation information, congestion information and tourist information, as well as implement measures to promote public transportation use in cooperation with educational and commercial facilities.

Overall Picture for Initiatives

Source: Ministry of Land, Infrastructure, Transport and Tourism

Implementing district	Area around Shin-Yurigaoka Station on Odakyu Line
Implementing entity	Kawasaki City, Odakyu Electric Railway Co., Ltd., Odakyu Bus Company, Kawasaki Hire Company, Kanachu Taxi Co., Ltd.
Initiative outline	• The MaaS application EMot allows users to search and make arrangements for trains, buses, on-demand transportation, cabs and car sharing in an integrated manner. • Promote the safe and comfortable use of public transportation by providing real-time operation information and congestion forecasts for each train and station on the Odakyu Line, and providing sightseeing information.
Technologies and data used	• MaaS applications, on-demand car dispatch systems etc.

Aizu Samurai MaaS (Aizu area)

As a tourism and lifestyle MaaS, provide services such as real-time information dissemination on service suspensions, congestion etc., registered PF of facility and store information, and ticketing for various modes of transportation, as well as realizes linkage with MaaS applications in other regions.
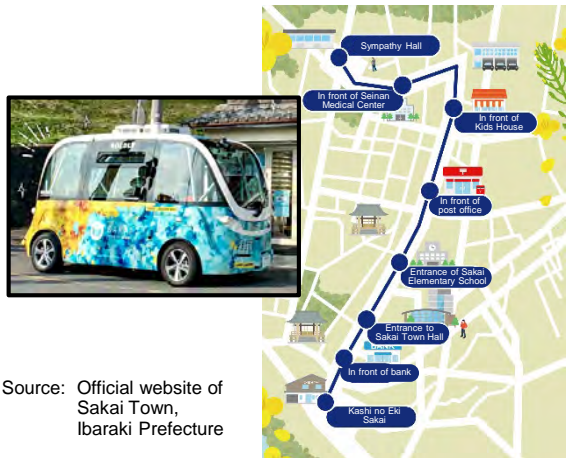
Description of Business

Source: Aizuwakamatsu City

Implementing district	Aizu area
Implementing entity	Aizu Samurai Maas Project Council
Initiative outline	• Real-time information reflection in COVID-19 pandemic etc. (service suspension, congestion etc.) • Registration PF for linkage with facility and store information • Construction of infrastructure to enable demand-generating ticketing etc., in collaboration with the Hitachi region • Collaboration with other regional MaaS
Technologies and data used	• MaaS system etc.

Steady-state operation of automated buses (Sakaimachi, Ibaraki Prefecture)

Started operation of Japan's first automated bus on a regular, scheduled route as a daily route bus.

Source: Official website of Sakai Town, Ibaraki Prefecture

Implementing district	5-km round-trip route connecting Sakai Sympathy Hall NA-KA-MA and Sakai Riverside Station, the center of local revitalization activities in Sakai Town
Implementing entity	Sakaimachi, Ibaraki, BOLDLY Corporation (operation management), MACNICA, Inc. (maintenance)
Initiative outline	• Route connecting the town's base facilities • No boarding fee, 16 flights/day. • There are a total of eight bus stops, including those in front of hospitals and post offices. • This is the first time in Japan that a local public body has operated an automated bus on public roads on a regular basis.
Technologies and data used	• Automated driving technology • 3D map data collection, obstacle detection sensors etc.

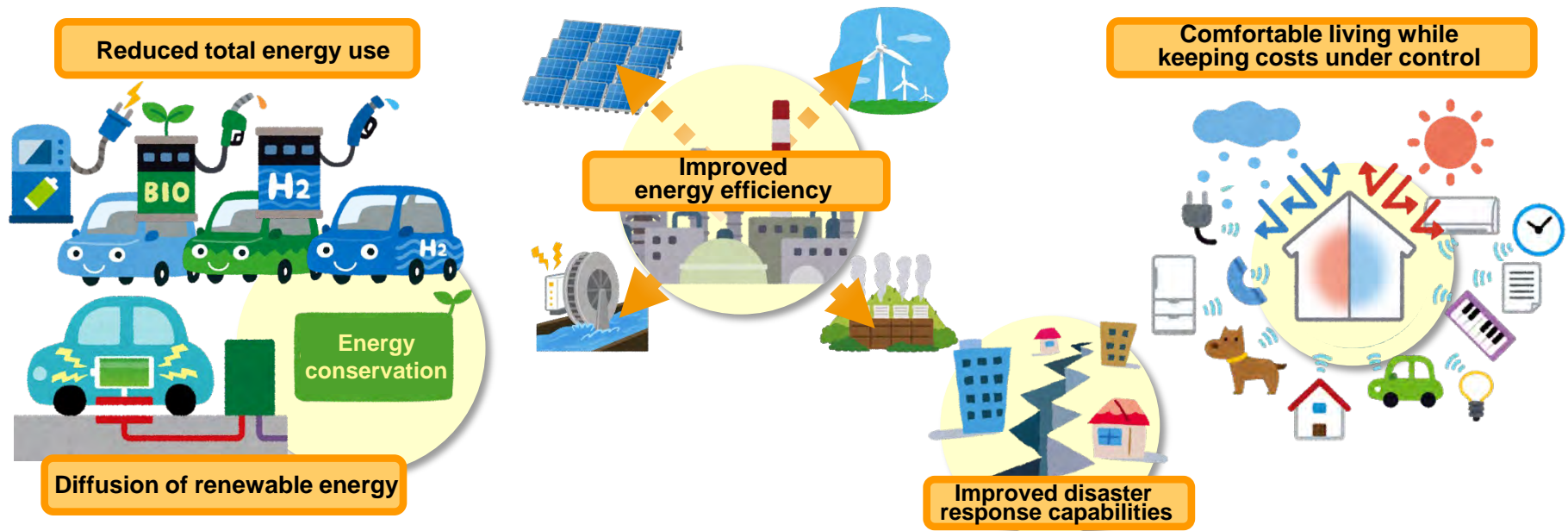# Future Realized by Smart Cities: Environment / Energy

Issues faced by region

- ✓ Progress of climate change issues, demand for transformation to a sustainable society
- ✓ Improved disaster preparedness to ensure energy supply in the event of a disaster
- ✓ Emphasis on economics (reduction of energy costs)

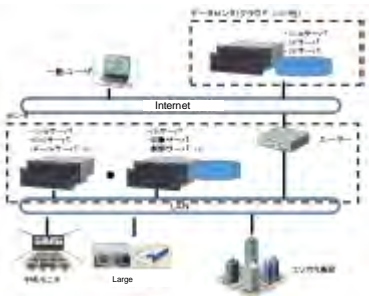## Illustration of Future Realized by Smart Cities: Environment / Energy

- ○ Aim for **a sustainable society by reducing energy consumption and promoting renewable energy**.
- ○ Aim to **improve overall energy efficiency** through decentralization of power sources and to **improve disaster response capabilities**.
- ○ **Ensure comfortable living while controlling costs** by combining improved building insulation with smart technology

Reduced total energy use

Energy conservation

Diffusion of renewable energy

Improved energy efficiency

Improved disaster response capabilities

Comfortable living while keeping costs under control

Future Realized by Smart Cities: Environment / Energy examples

Energy management of the entire town with AEMS (Kashiwa-no-ha)

Wisely utilize energy in the city by optimizing electricity distribution based on electricity demand forecasts and by guiding tenants to energy-saving behavior


Short-term	Evolution of AEMS
	➢ Review of functions with usage issues
	  Initiative 2-1: Cloud computing of AEMS data and improvement of demand forecasting accuracy
	  Initiative 2-2: Introduction of IoT platform for maintenance management of photovoltaic power generation facilities

Mid / Long term	Expansion of AEMS utilization area ➢ Feedback to building side Realization of advanced automatic control ➢ Forward and Feedback by introducing AI and Deep Learning Realization of sustainable area management based on AEMS

To a system that can support integrated operation for energy conservation optimization through analysis from the entire area to the equipment level, performance verification and optimal control

Implementing district	Kashiwa-no-ha district
Implementing entity	Mitsui Fudosan, Hitachi, Nikken Sekkei Group
Initiative outline	• Collection, analysis and control of related data through the introduction / update of Area Energy Management System (AEMS) • Utilization of energy-saving navigation systems
Technologies and data used	• Energy data • Facility operating conditions, weather, temperature, humidity day • Energy management etc.

Advanced park management (Umekita 2nd District)

Aim to reduce manpower and costs in maintenance and operation by introducing robots etc., while understanding park congestion through image analysis
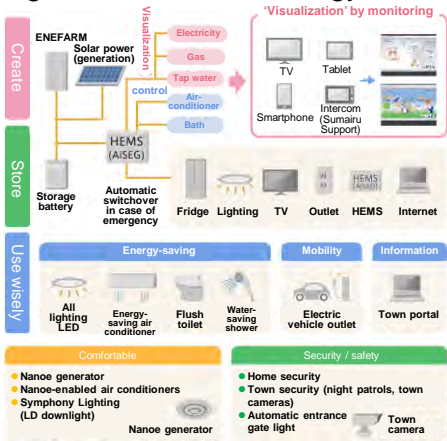
Outline of demonstration
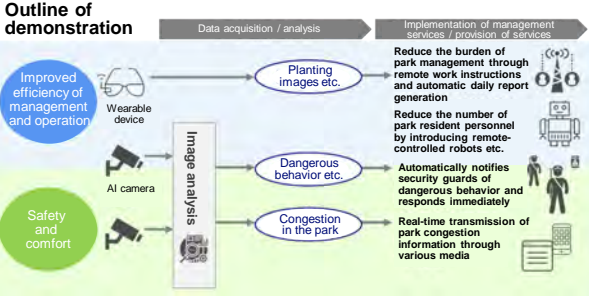
Source: Umekita 2nd District Smart City Formation Council Materials

Implementing district	Umekita 2nd District (Osaka City)
Implementing entity	Umekita 2nd District Smart City Formation Council
Initiative outline	• Introduce state-of-the-art technology by taking advantage of the green field in the Umekita Phase 2 district, which has a vast urban park in a terminal location. • Aim to create businesses and enhance management through the utilization of human data and the introduction of robots and other equipment.
Technologies and data used	• People flow data, facility management data • Robots, image analysis technology etc.

Town producing and consuming own energy with smart HEMS (Fujisawa SST)

All detached houses have energy-creating, energy-storing and energy-saving functions, making the entire town's energy use visible

Source: Fujisawa SST Council website

Implementing district	Site of the former Panasonic factory in Fujisawa City is approximately 19 ha (about 1,000 households. 400 of which are planned for housing complexes)
Implementing entity	Fujisawa SST Council of 18 organizations led by Panasonic Corporation
Initiative outline	• Sustainable urban development through collaboration among industry, government, academia and residents, aiming for a town that will continue to evolve for 100 years • The business focuses on energy, security, mobility, wellness and community
Technologies and data used	• Energy data • Energy-creating equipment (solar power generation, household fuel cells etc.), energy-storing equipment (storage batteries etc.) and energy-saving equipment

5

Future Realized by Smart Cities: Disaster Prevention

Issues faced by region

- ✓ Reduction of damage caused by disasters due to frequent extreme weather events (flooding of rivers, inland waterways and landslides etc. due to heavy rainfall)
- ✓ Improved living conditions in evacuated areas
- ✓ Improved efficiency and safety of rescue

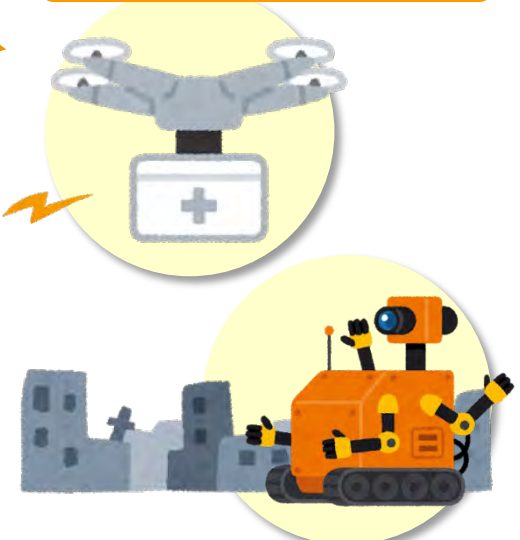## Illustration of Future Realized by Smart Cities: Disaster Prevention

- ○ **Convert topography and weather into data, and promote optimal countermeasures** by society and individuals **according to forecasts and simulations.**
- ○ When a disaster occurs, establish a system that enables **appropriate evacuation guidance and disaster response through visualization and analysis of information**.
- ○ Enable rescue operations that take into account population decline and the safety of rescuers through the use of robot technology and other means.

Data-driven forecasting and simulation

Safety-conscious first aid activities
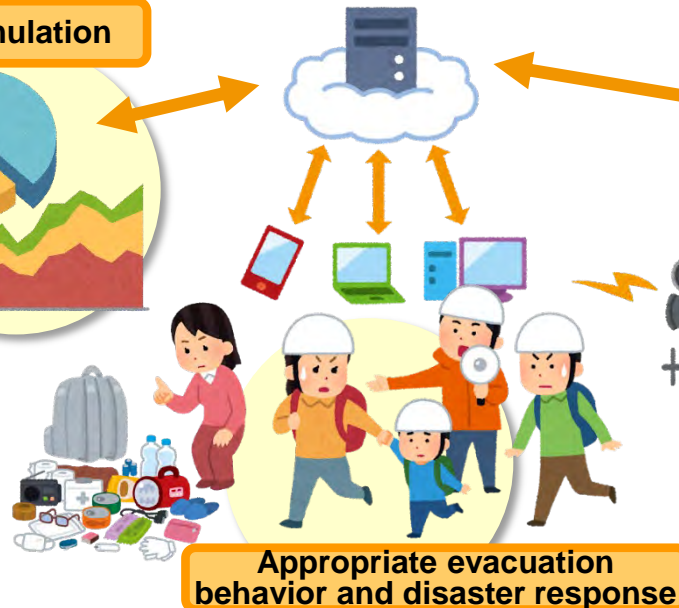
Appropriate evacuation behavior and disaster response
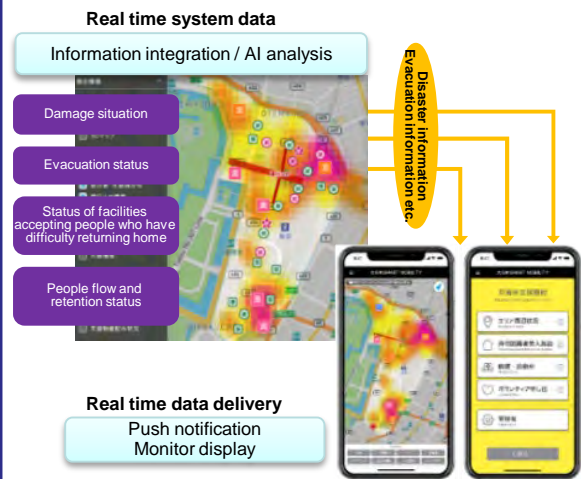
Future Realized by Smart Cities: Disaster Prevention examples

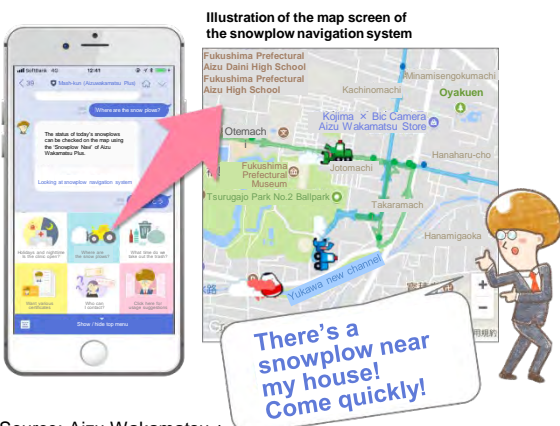## Disaster communication tools Disaster prevention information dissemination (OMY district)

Real-time collection, analysis and visualization of human movement, retention, damage etc., and push notification of evacuation information etc.

Implementing district	OMY area (Otemachi, Marunouchi, Yurakucho), Chiyoda-ku, Tokyo
Implementing entity	The Council for Area Development and Management of Otemachi, Marunouchi and Yurakucho
Initiative outline	• Promote area management that utilizes data by linking data through the 'OMY version of data platform' and visualizing and analyzing the data on the 'Digital Map Twin' 2D/3D model of the city and other dashboards
Technologies and data used	• People flow data, disaster data • Facility status data etc.

Disseminate information on the location of snow removal vehicles in the city (Aizuwakamatsu City)
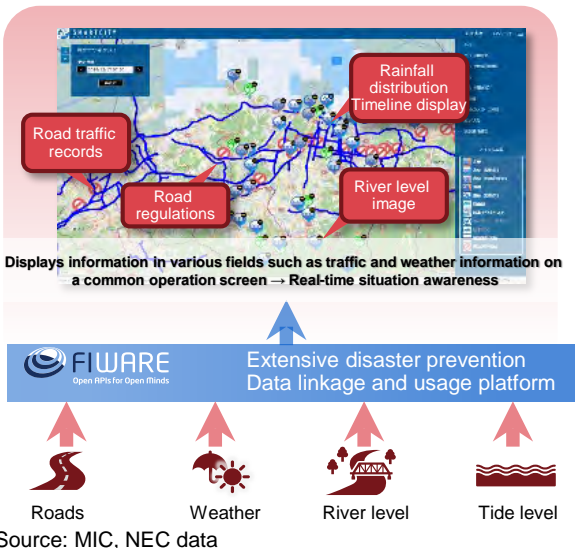
Location information on approximately 270 snow removal vehicles in the city can be viewed through the Aizu Wakamatsu+ (Plus) data platform and AI chatbots utilizing LINE.

Illustration of the map screen of the snowplow navigation system

There's a snowplow near my house! Come quickly!

Source: Aizu Wakamatsu +

Implementing district	Inside Aizuwakamatsu City
Implementing entity	• Snowplow operation system Aizuwakamatsu City Road Section • Data platform (Aizu Wakamatsu+) Smart City Aizuwakamatsu Promotion Council (e.g., The University of Aizu, Hondaya Honten Y.K., Green Power Generation Aizu, Wakamatsu Gas, Aizu Bus, Aizuwakamatsu City)
Initiative outline	• The snowplow operation status can be checked via PC or smartphone using the 'snowplow operation system' that utilizes GPS data.)
Technologies and data used	• Data linkage platform • GPS data etc.

Wide-area disaster prevention using data linkage infrastructure (Takamatsu City etc.)

The two neighboring cities and towns will jointly use Takamatsu City's data linkage infrastructure to centrally manage disaster prevention information and improve their ability to respond to wide-area disasters.

Displays information in various fields such as traffic and weather information on a common operation screen → Real-time situation awareness

Extensive disaster prevention Data linkage and usage platform

Roads   Weather   River level   Tide level

Source: MIC, NEC data

Implementing district	Takamatsu City, Kan-onji City, Ayagawa Town
Implementing entity	Takamatsu City, Kan-onji City, Ayagawa Town
Initiative outline	• Linkage of disaster prevention data among Takamatsu City, Kan-onji City and Ayagawa Town • Operation and maintenance costs are shared through a copayment system.
Technologies and data used	• Road traffic, weather, river level and tide data • Data linkage platform etc.

Future Realized by Smart Cities: Infrastructure Maintenance and Management

Issues faced by region

- ✓ Aging existing infrastructure that supports the daily lives of citizens and business activities of companies
- ✓ Balance between safety assurance and repair / renewal investment costs
- ✓ Maintenance and improvement of living standards

Illustration of Future Realized by Smart Cities: Infrastructure

- ○ **Collect data using sensor technology etc., and analyze and predict using AI to improve the efficiency and sophistication of infrastructure maintenance and management .**
- ○ Optimize investments to **create a secure city while controlling costs.**
- ○ Through the collection of data, develop **new services etc. that help maintain and improve the standard of living of citizens**.

Sensor technology

Data collection

Analysis and Forecast

AI

Optimization of Investment

Development of new lifestyle services etc.

Infrastructure Maintenance and Management

Toward a safe town while controlling costs

Future Realized by Smart Cities: Infrastructure Maintenance and Management examples
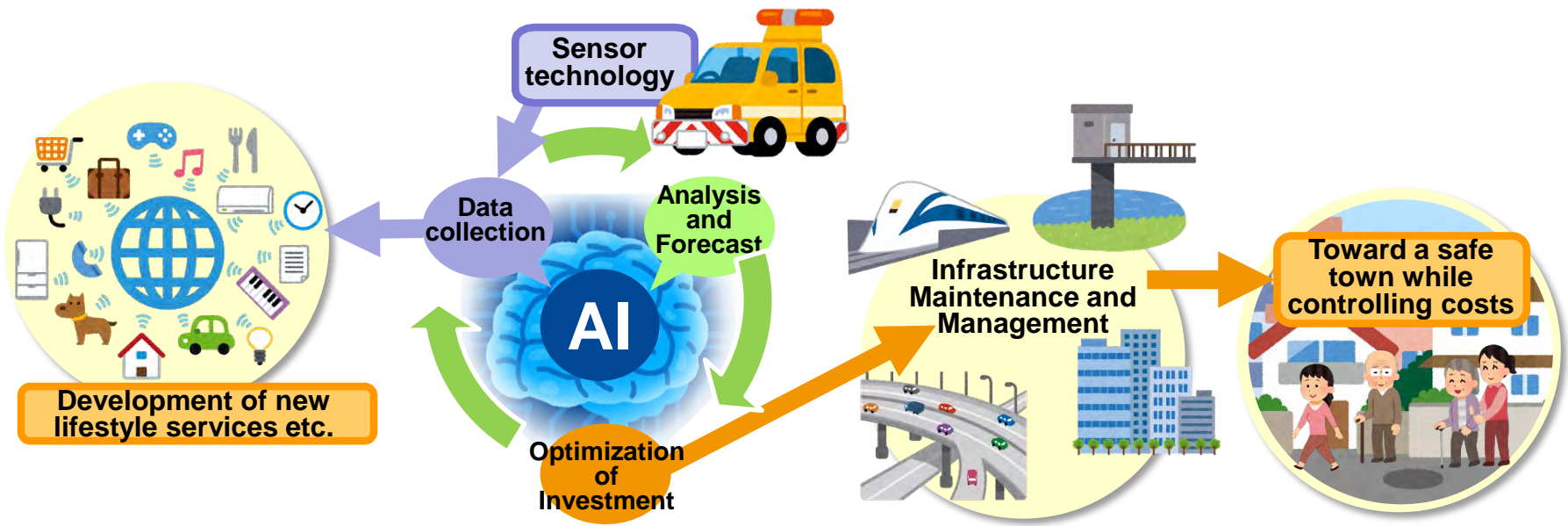
Building management using robots (Haneda Innovation City in Haneda zone 1)

Use of automated cleaning and delivery robots through integrated robot control
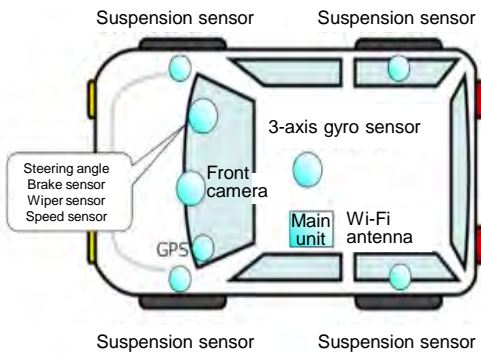

🤖 Smart robotics

Automatic cleaning	Automatic delivery	Avatar robot

Implementing district	Haneda Innovation City in Haneda zone 1 (Haneda Airport Site Zone 1 Development Project Phase 1)
Implementing entity	Haneda Innovation City in Haneda zone 1 promotion council
Initiative outline	• Demonstration of automatic cleaning robots for use in cleaning operations in and around buildings. • Conducted a demonstration with Avatar Robot for use as a leading transportation robot and security service.
Technologies and data used	• Self-driving robot • Data linkage platform etc.

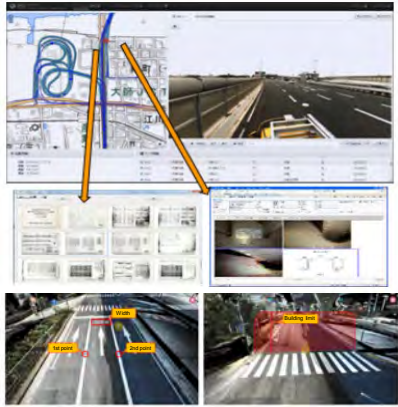## Infrastructure maintenance management using IoT (Masuda City)

Data is collected by a center installed in official vehicles, data is analyzed by AI and used for road management.

Implementing district	Masuda City, Shimane Prefecture
Implementing entity	Masuda Cyber Smart City Creation Council
Initiative outline	• Road monitoring sensors attached to Masuda City official vehicles to monitor road conditions in the city • Collected data is expected to be released on an IoT server and used for city street management use and various research and development as street data.
Technologies and data used	• WiFi and FTTH • Image analysis by AI • Data linkage platform, etc.

Smart Infrastructure Management System (Metropolitan Highway)

Linking GIS to various types of information for quick retrieval, site survey and measurement with the system

Source: Metropolitan Expressway website

Implementing district	Metropolitan Expressway
Implementing entity	Metropolitan Expressway Group
Initiative outline	• Data platform On the GIS platform, information necessary for maintenance and management, such as various structure specifications, inspection and repair history, can be quickly retrieved and collected. • Digital twin with 3D point cloud data Collected 3D point group data can be used for field measurement, the creation of drawings, construction simulation etc.
Technologies and data used	• GIS platform, 3D point group data, Infra Doctor, image analysis, AI, robots, drones etc.

9