For Realization of Smart City with Advanced Interdisciplinary Research towards Innovation

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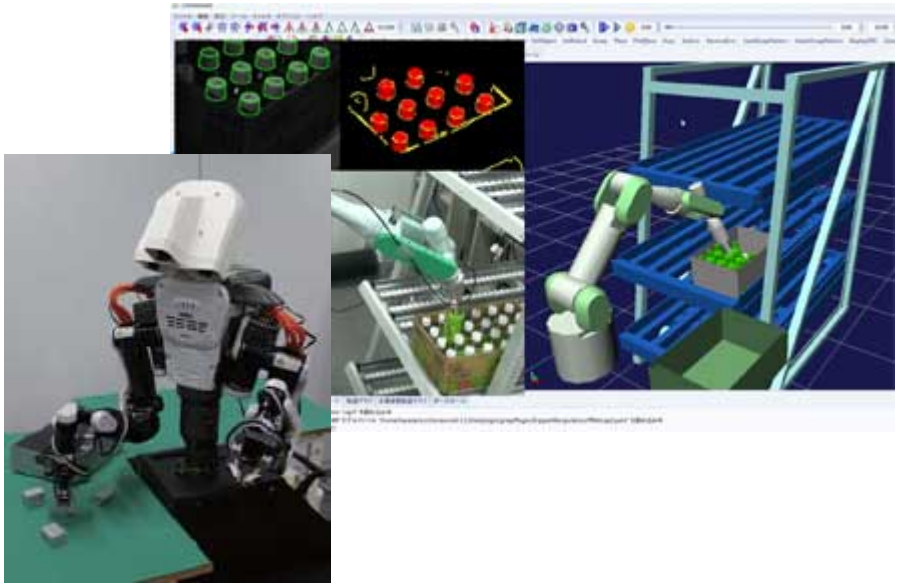
HRP-3

HRP-2

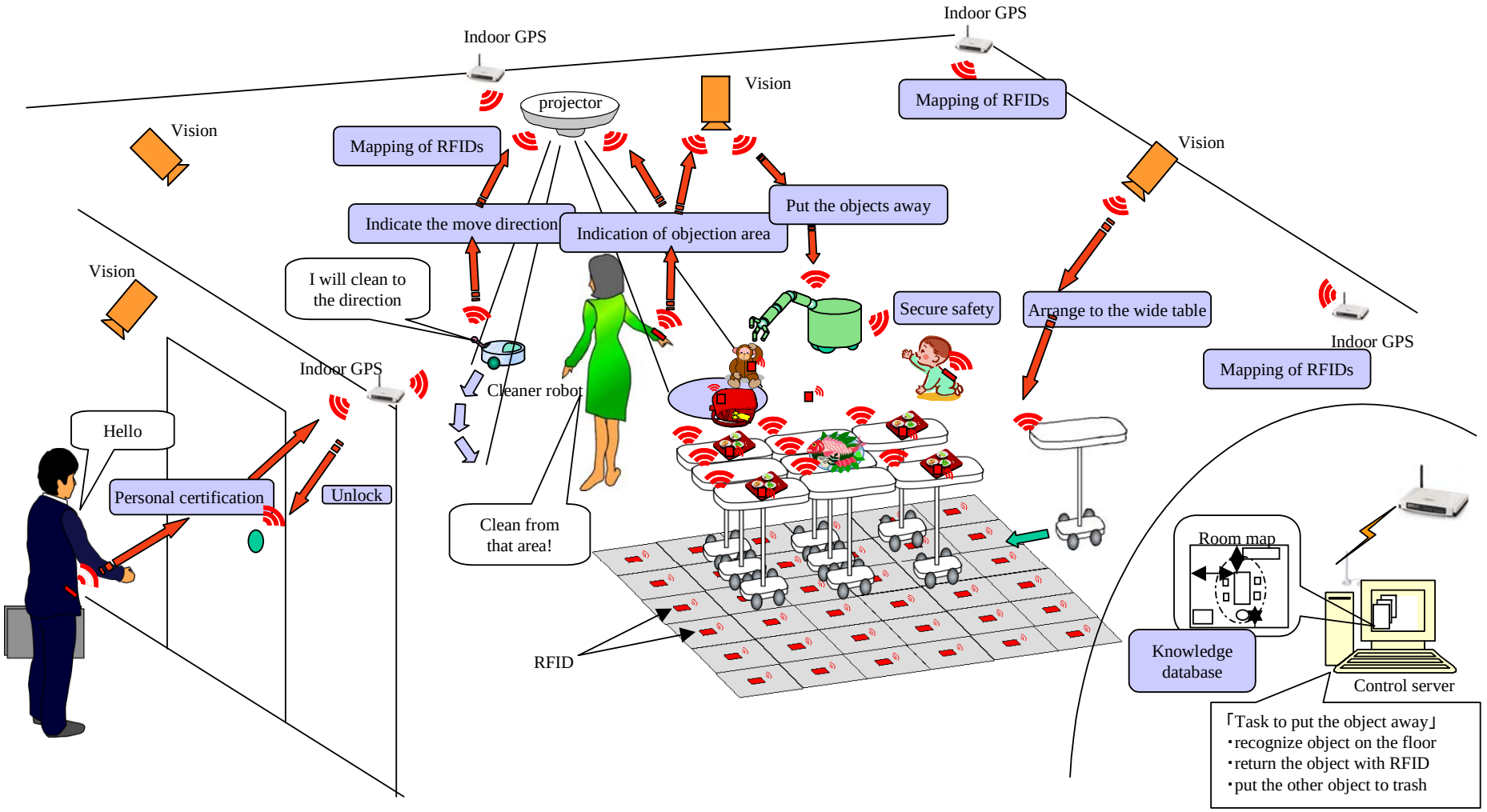
New hardware
New theory
New applications

HRP-4C

HRP-4



Concept image of Ubiquitous Robotics

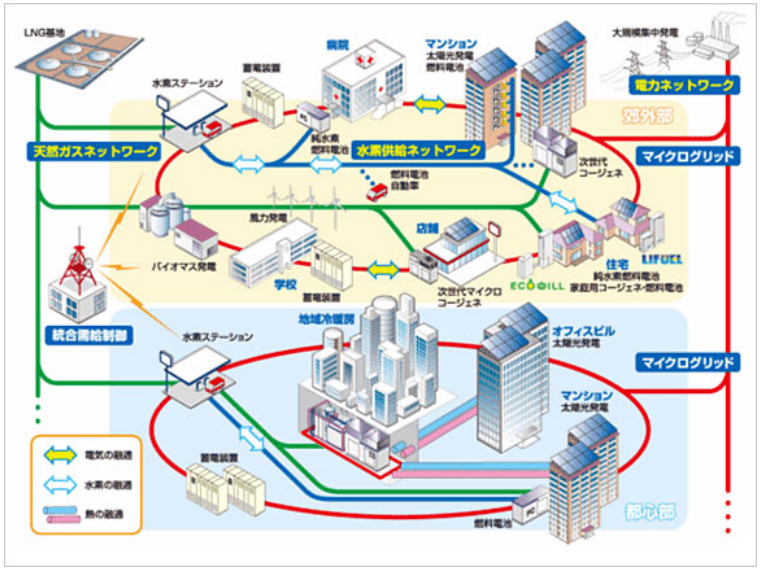


Experimental Living model for Ubiquitous Robotics

Smart grid

- Obama announces “Green New Deal”
- The heavy use of natural energy unstable electricity, smart grid is essential.

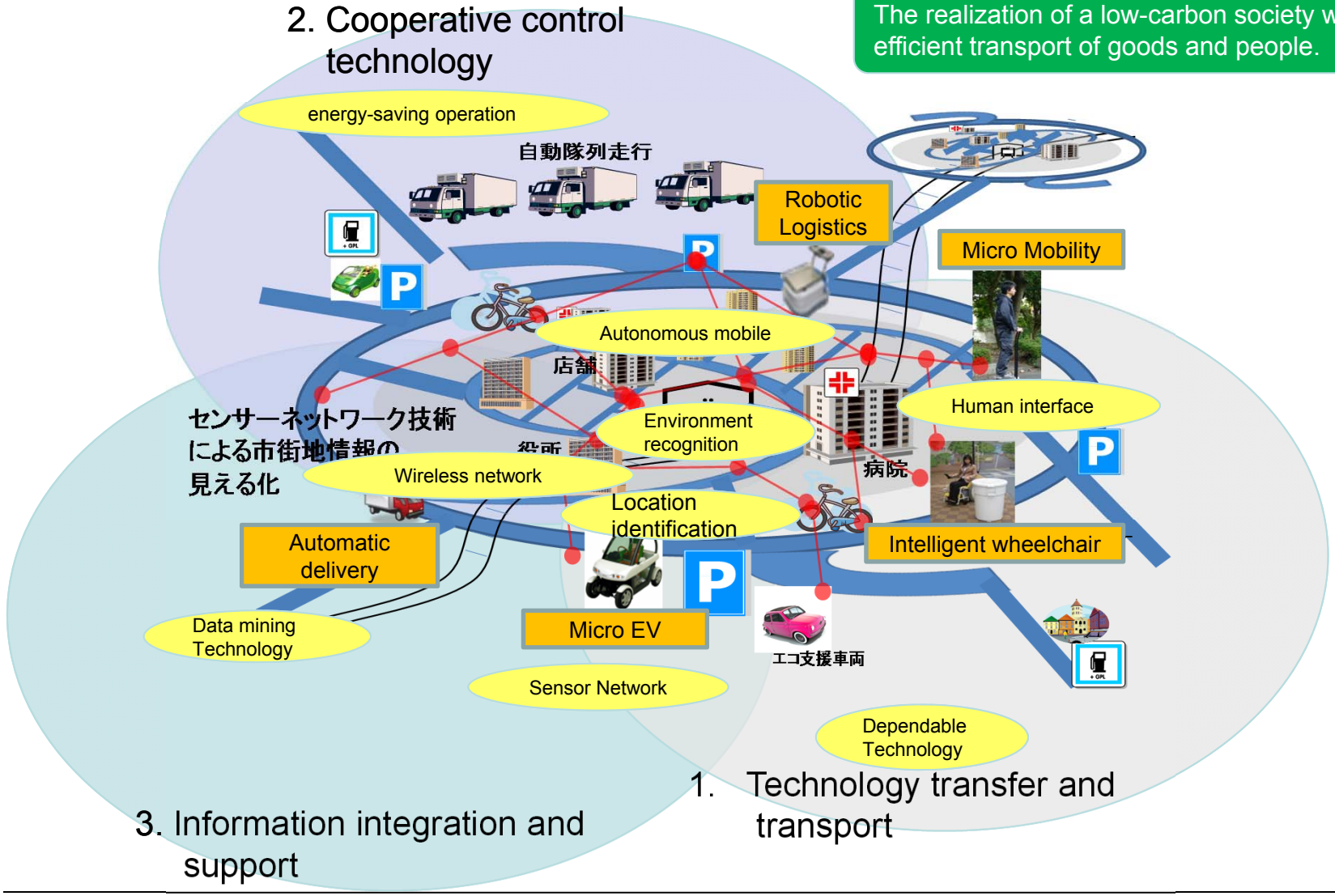
- Communication and control system is incorporated into the power grid.
- Home and industrial facilities, such as power generation facilities and buildings are connected.
- Not only to control the amount of power generated will be adjusted to the amount of power used.
- Standardization of network protocols are discussed.



In the transmission line, PLC as a network system is used.
Standardization in building equipment control using Zigbee and PLC is discussed in the home and office, .

Robotization of whole city in Compact City concept

The realization of a low-carbon society with more efficient transport of goods and people.



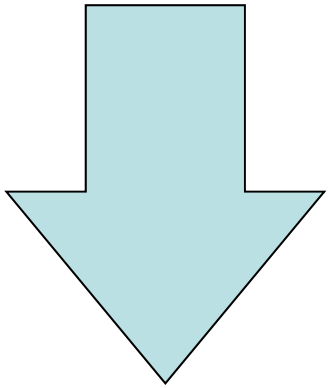
Smart Community

"Smart Community Alliance" under the keyword smart community has been established.

More than 350 companies are participating.

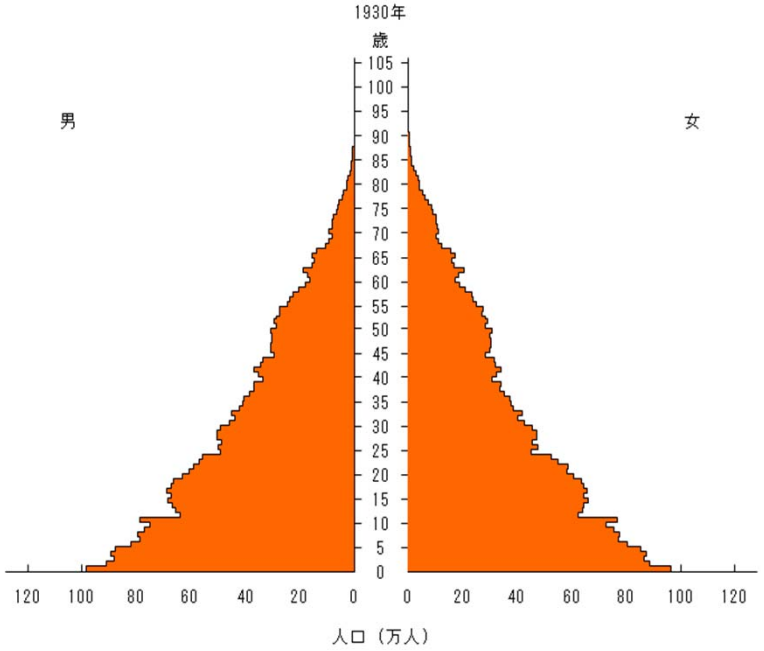
The public-private activities together for the realization of smart communities is being promoted.

Many of the company is a manufacturer.
Because it begins from the discussion of how to use their hardware, concrete action plans is difficult to build.



It is necessary to be discussed from the future vision such as "What kind society do you want?"

Aging society problem
（Actual and forecast situation）



国立社会保障・人口問題研究所

Because the elderly will increase, Japan is facing the problem of increasing the financial burden.
Measures are needed to reduce the medical and care burden of the elderly.
Measures to keep the elderly healthy is necessary.

The mapping of the keywords in Aging society

Health (from the definition WHO)

Physical

Vital function

Activity level

Safety

Medical care

Nursing care, Assistance

Work support

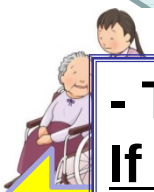
Universal design

Physical health

Richness of things

Hobbies and Sports

Real experience



- The desired aging society -

If persons of different ages and gender with a variety of experience, can built mutual relation to each other continuously, then, a society in which individuals obtain mental peace of mind should be built.

Informational convenience

Inf

the

Social participation

Virtual Expe

Contribution to society

Connection

Human relations

Role

Rewarding

Active duty on Lifetime

Purpose in life

Entertainment

Peace of mind

Elation

Responsibility, pride

Richness of the heart

Mental health

Second life

Psychological Mental

Personal

Society

Compact City with autonomous social system in energy power, transportation, medical care, etc.

（1） Power supply technology that can quickly respond to disasters and power demand

Smart grid　Renewable energy

semi-autonomous power system by storage facilities and power generation facilities in the region

（2） Network technology that is not cut even when the disaster

Sensor network

Visualization of the region by sensor networks for environmental information management of a comprehensive regional

（3） Movement and transport technology that connects the residential, commercial, and industrial district

Drive assist　Intelligent city traffic

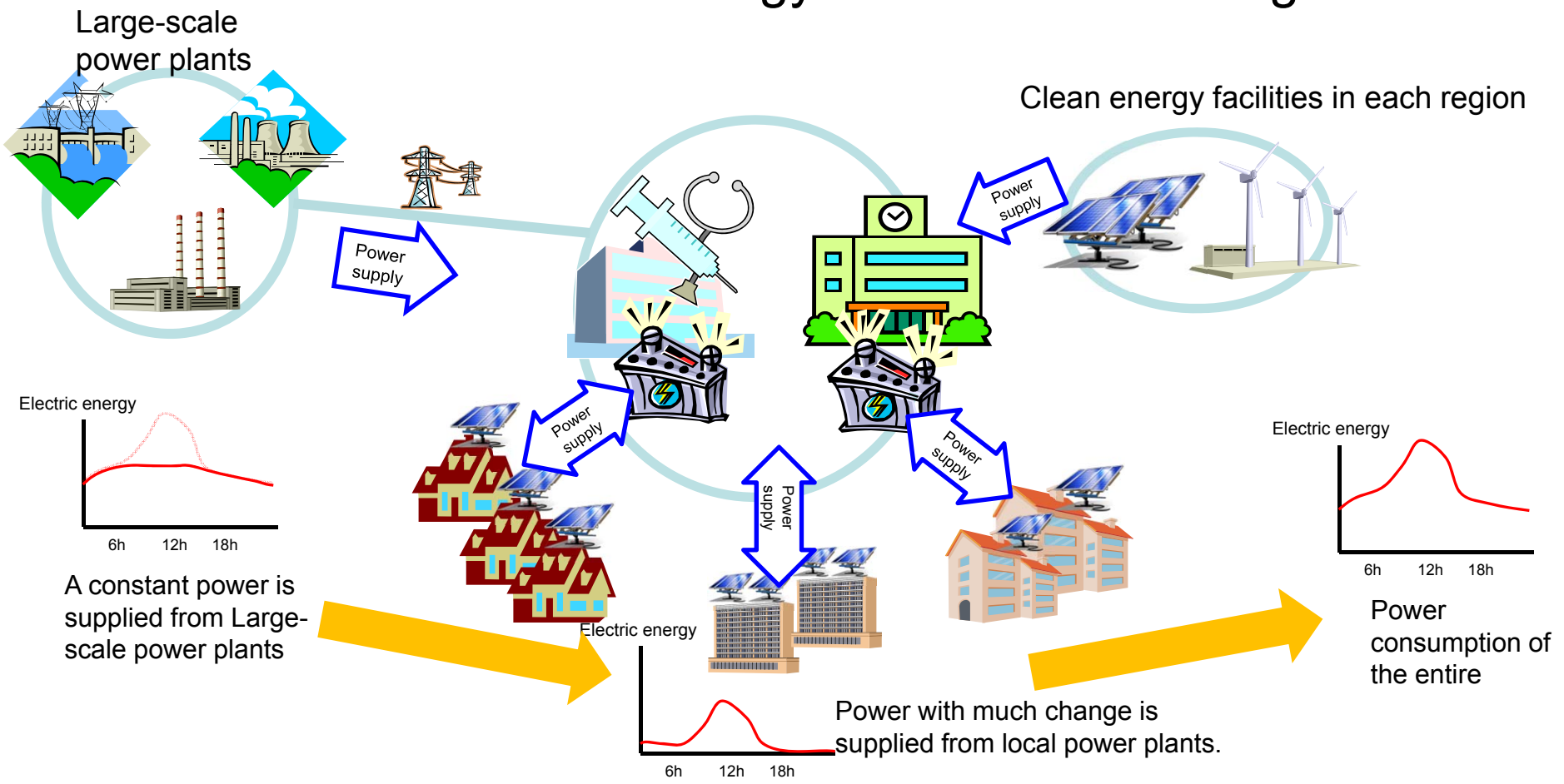
Improve the robustness of the system by promoting transportation (electric vehicles) mobility in the region move

（4） Assistive technology to promote independence and social participation

Robotics

Promotion of social participation by the combination of mobility and support robots

(1) Power Energy independence by combination of storage facilities and clean energy facilities in each region

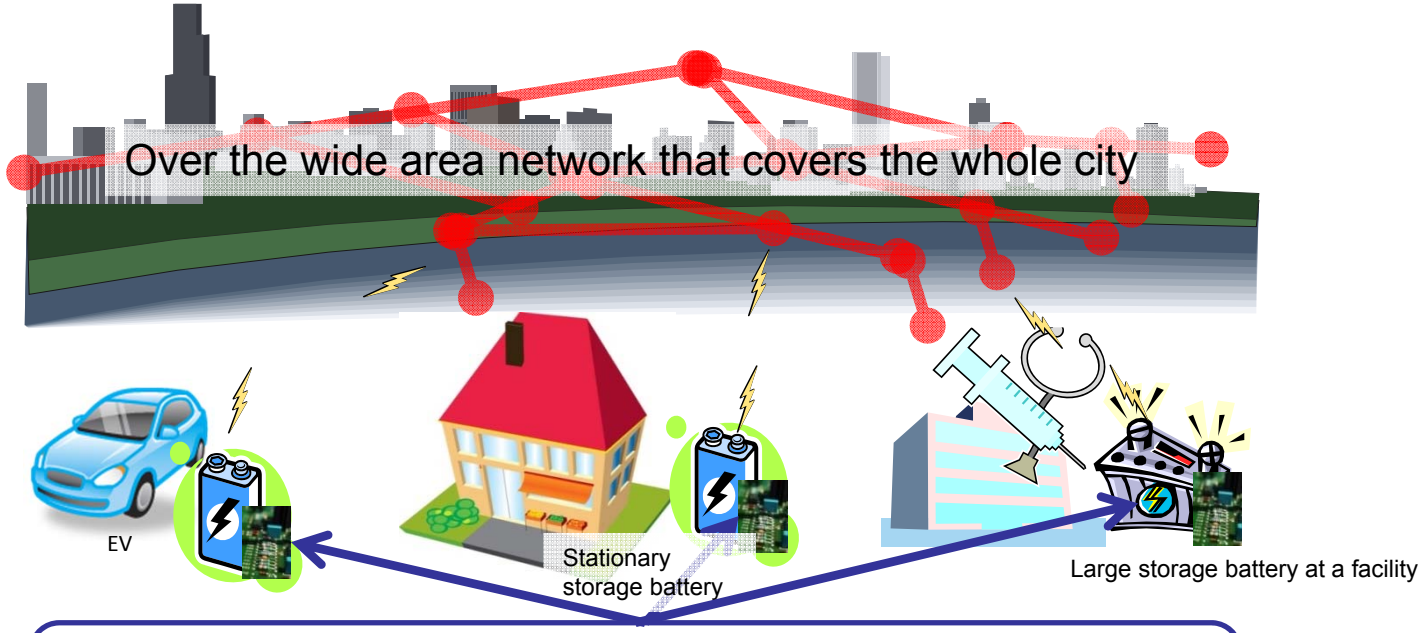


- In large-scale power plant, high efficiency is achieved by a constant power supply.
- In local power plant with clean energy, the variation power is supplied.
  Even if the large-scale power plant is down in a disaster, the local plant can supply the power with minimal autonomy.

(2) Network

Visualization of Compact City

The information of the local environment by sensor network



Combining the battery, the communication devices and the GPS, various environmental information and power information are transmitted over the network.

- Storage Information → Energy management on the whole city
- Facility Information → Drive recorder, Maintenance information on a home
- Sensor information on the equipment (Temperature, humidity, location)
  → Resident care service, Disaster information management

(3) Movement and transport

Applying mobility robots in residence and Commercial area

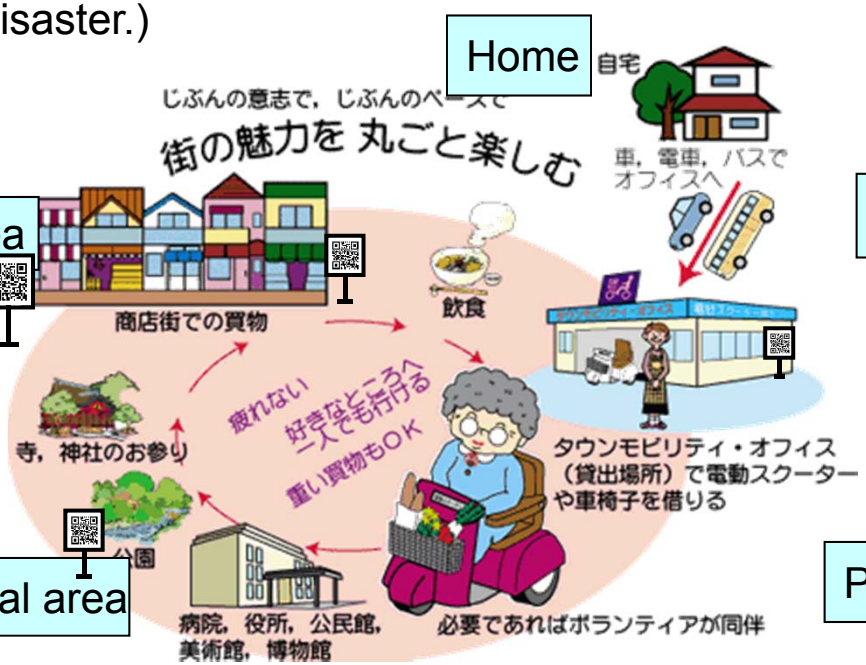
Potential as a convenient and safe means of transportation for the elderly

・Autonomously move to the destination, such as residence, hospitals, public area, and commercial area

・Automatically detection and avoidance of the dangerous environment (step down and groove) and unsafe conditions (a collision with people, bicycles, etc.)

・ Structured environment in the town not only for robot navigation but also for person navigation. (e.g. usage of 2D marker: High-precision location-aware without power energy. robustness for a disaster.)

Autonomous locomotive function



Obstacle avoidance function

(4) Independence and social participation

IRT technology to support the independence and social participation of the elderly

Promotion of social participation and improvement in QOL

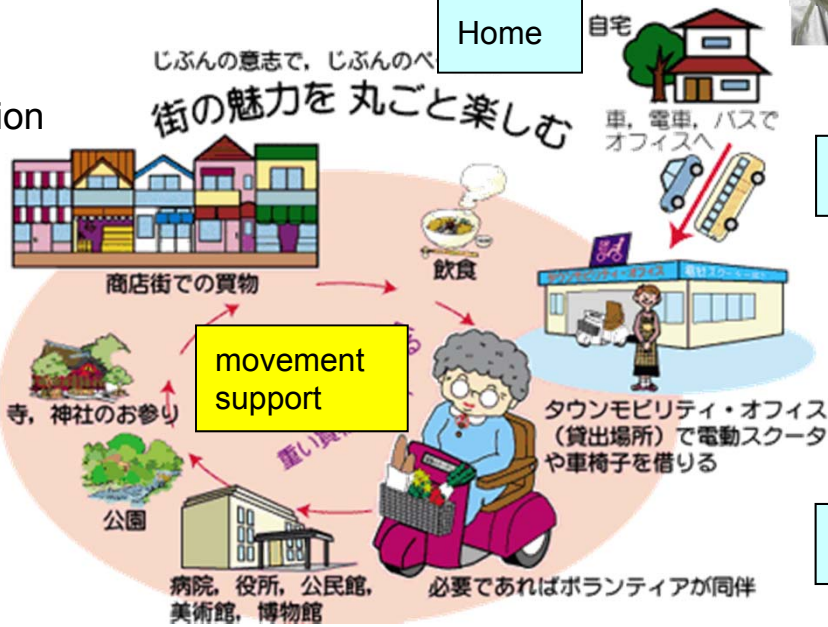
- Applying robot for assistance at various hospitals, facilities.
- To promote social inclusion by providing a set of movement support.
- To prevent functional decline of the disuse syndrome by increasing the activities and social participation.

Support improve the QOL
- Activity with own will.
- To provide peace of mind

Home

Making purpose of social participation
- Activities of dementia prevention

Public facility



Hospital

Welfare facility

Park

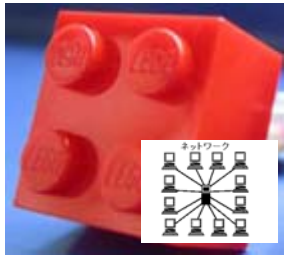
For realization of a Smart city

- Modularization of the hardware and Standardization of the hardware interface.
- Integration technology for various systems according to the requirements of the local situation.
- Joining researchers of many research field (from Engineering to Sociology).

Realization of vision images made by Modularized Hardware

Solar power

Wind generation



Network

Electric vehicle

Modularized Hardware
&
Open standard

Application Software

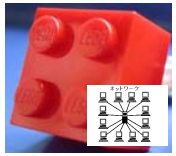
Integration and Systematization

Vision images in the region based on the request

Joining researchers of many research field for realization of a smart city

Various hardware models


Solar power


Network


Wind generation


Electric vehicle

Energy technology
Information technology
Control technology
Civil engineering
Architectural engineering
etc.

Integration of smart city for local demands

Making future vision images

Sociology
Psychology
Economics
Medical science
Care science
etc.