

Legal problems and challenges on Network Robot Systems in Japan

June 20, 2011 at Tallin

ATR Social Media Research Laboratories Group &
ATR Intelligent Robotics and Communication Labs

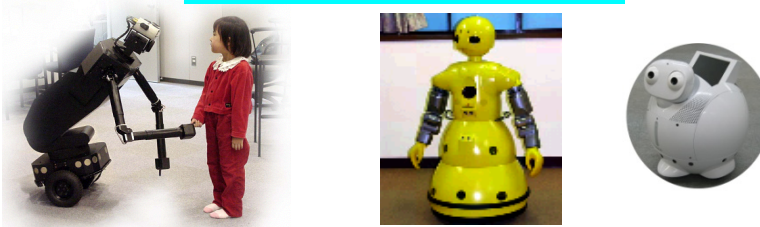
Director and ATR Fellow
Dr. Norihiro Hagita

Network Robot Systems in 2003

Ubiquitous
Network



"Visible" type



Network Robots

"Virtual" type



"Unconscious" type



What is Network Robot System?(right now)

ICT Infrastructure
(Cloud and Ubiquitous Computing & High-speed Wireless Communication,...)

Visible-type

Physical Robot, Android, Geminoid,...



User Interface:

Broaden to Elderly

Price: competitive to bike or vehicle, (or hobby)

Ubiquitous Network Robot Platform

Virtual-type

iPhone, iPad, DS-3D, ...



User Interface:
easy-to-use & inevitable utility in daily use

Price: Reasonable

Unconscious-type

RF-ID, Camera, LRF,...



Location Precision:

3m → 5cm accuracy

Price: gradually decreasing

Visible-type Robots

-Physical robots-

Visible-type Robots

- Physical robots -

Physical safety:

Robots have risks to fall down, pinch, bite or hit someone, etc.



Product liability

Product liability is the area of law in which manufacturers, distributors, suppliers, retailers, and others who make products available to the public are held responsible for the injuries those products cause. Although the word "product" has broad connotations, product liability as an area of law is traditionally limited to products in the form of tangible personal property.

Physical safety in Japanese Law ^{ATR}

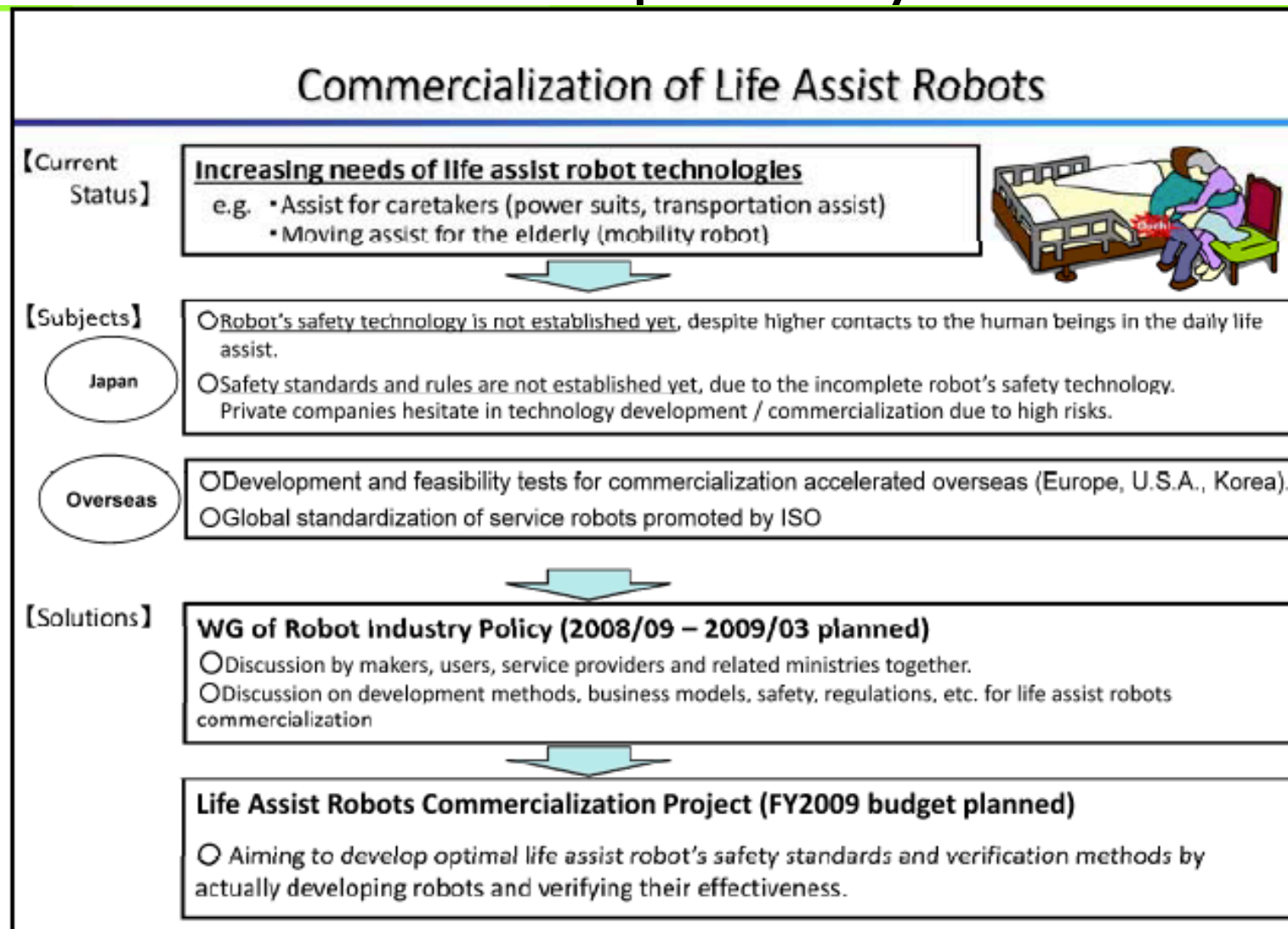
- Fault in the robot
→Manufacturer or (and) Vender has responsibility
- Mistake in manipulating
→Manipulator or (and) Employer has responsibility.

Robots are dangerous!
I don't want to be hurt!
I don't want to hurt someone!
I don't want to have any responsibility of payment!



We do not trust Robots
are safe!

METI's work to keep safety of Robots



(Quotation from a material made by METI)

Guideline on safety design for service robot

ISO/CD13482:

Safety requirements on personal care robots

ISO TC184/SC2 WG7:

Personal care safety, Robots and robotic devices,
Automation systems and integration

* ISO(International Organization for Standardization)

Commercialization of DustBot Project ^{ATR}

Peccioli testing: new road signs

Robot Lane



'Attention. Area subject to robotic testing. Yellow lane used by robots'.



'Attention. Robot crossing. Yellow lane used by robots'.

Visible-type Robots -Sarrogates-

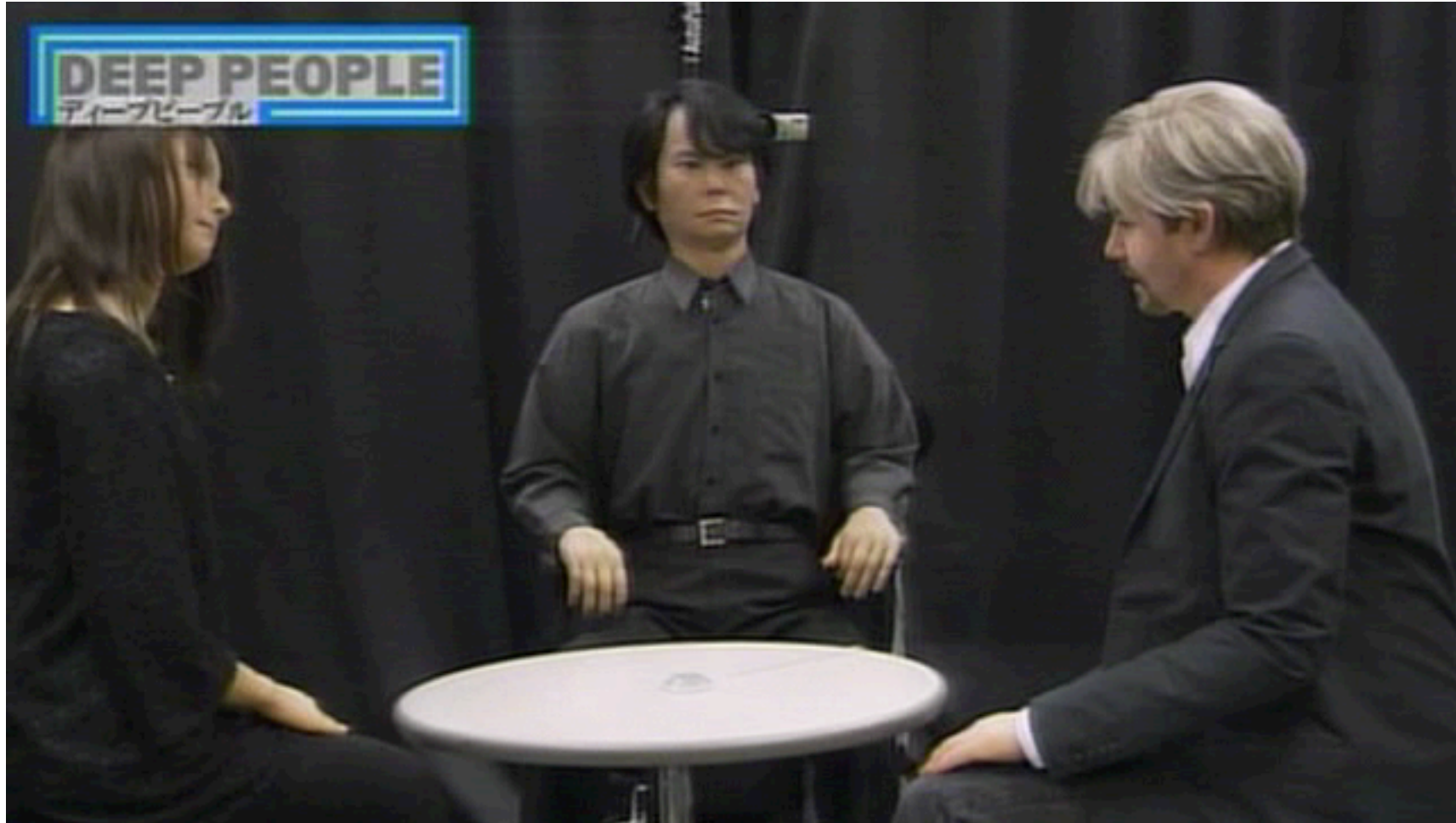
Case study: Taking pictures in highway gates in Japan
-Balance between public services and privacy-

- Tokyo district court decides in 2001:

Highway companies allow to take pictures on user's face for public purpose in gates even though the car ID number and driver's expression were identified from the images, because the image processing data will be expired in a short range.

Q1) Are sarrogates(visible-type) accepted among people as Urban Service Robots?

Who might be sarrogates?



Q2) Collecting personal data with robots is illegal?

Hello, Yoko Kato-san. Did you like the bag you bought in Tokyo lastweekend?

Why do you know my name and what I bought in Tokyo?



Q1) Are sarrogates(visible-type) accepted among people as Urban Service Robots?

Q2) For example, collecting personal data with robots (visible-type) is illegal?

Shopping Mall in 2007

-Autonomous and Tele-operated HRI-

Users register their Robovie straps with RFID-tag for cell phone in advance.
That means they accepted the NRS.



Shopping Mall in 2007

-Autonomous and Tele-operated HRI-

Different utterances for repeat users



Takayuki Kanda, Masahiro Shiomi, Zenta Miyashita, Hiroshi Ishiguro, Norihiro Hagita, An affective guide robot in a shopping mall, Proc. of the 4th ACM/IEEE International Conference on Human-Robot Interaction(HRI2009), March 11-13, San Diego, CA.,(2009-03)



Shopping Mall in 2007

-Autonomous and Tele-operated HRI-

For users who have no strap with RFID tag



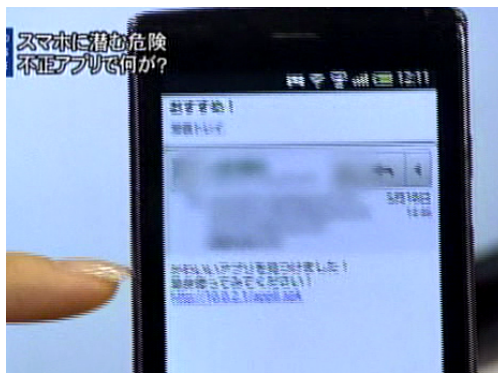
Virtual-type Robots

-Agents and Apps in
Smartphone and Tabletphone-

Virtual-type Robots

- Smartphones & Tabletphones-

Spoofing attack:



Spoofing email from an apparent friend(attacker) attached the App file, and then download it.

Terminal ID number is illegally identified and controlled by the attacker and PC.



SmartPhone / Device List SEND Com about

| IP Addr | 端末識別番号 | Device | 最終 |
|------------|--------|---------|---------------|
| 10.0.2.161 | | Android | 2011/05/24 13 |

[Reset]

不正アプリを実行 → 乗っ取り完了
外部のパソコンから自由に操作

Personal data in smartphone is illegally used, wire tapped and charged for the smartphone.

The owner of the smartphone is remotely taken snaps.

The attacker makes independent connections with the victims and relays messages between them, making them believe that they are talking directly to each other over a private connection, when in fact the entire conversation is controlled by the attacker. The attacker must be able to intercept all messages going between the two victims and inject new ones, which is straightforward in many circumstances



If the smartphone is connected with other PC for battery charge, music download, etc., the PC is infected or controlled.

Q1) Are sarrogates(visible-type) accepted among people as Urban Service Robots?

Q2) For example, collecting personal data with robots (visible-type) is illegal?

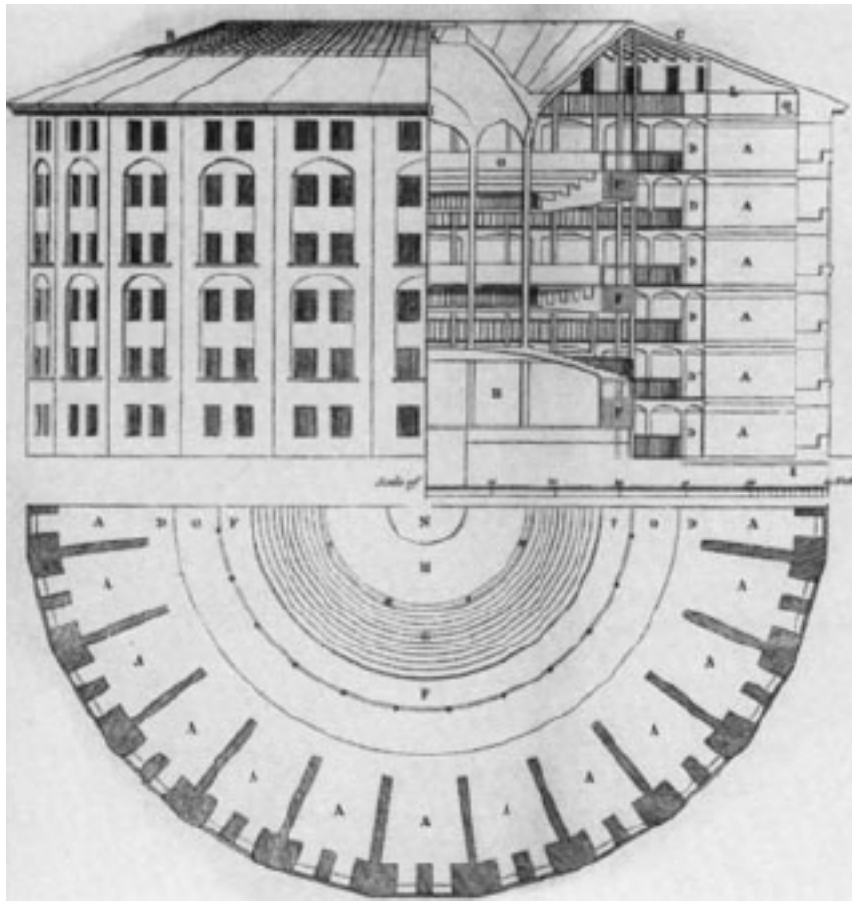
Q3) Smartphone(virtual-type) is fragile in terms of data safety?

Unconscious-type Robots

-Sensor Networks and Wearable sensors-

The Influence of modern Surveillance System to Human Being

Panopticon



chilling effect to individual liberties

blueprint by **Jeremy Bentham (UK)**, 1791

“Discipline and Punish (Surveiller et punir)”
by **Michel Foucault (FRA)**, 1971

Case Study: Taking photographs

Japanese Supreme Court grand bench decision (at December 24, 1969)

All people has the right not to be taken photographs without reason. This right is guaranteed by the Japanese constitution.

But there are **some exceptions**. For example, at the case **when the crime is proceeding**, or **just after the crime happens**, taking pictures by policemen without any warrant is reasonable. In these cases, there is a possibility of becoming legal.

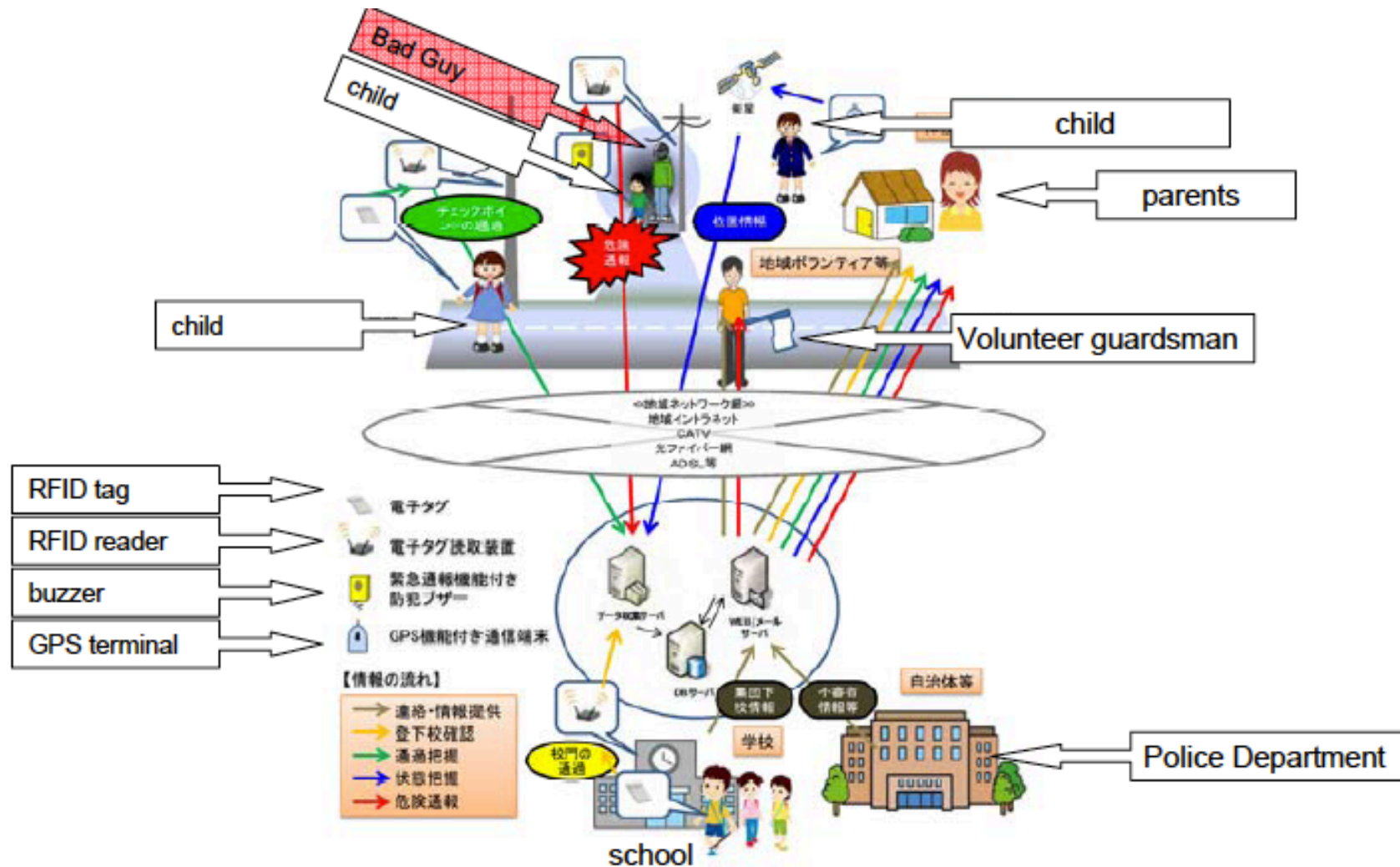


Supreme Court, Japan

Why collecting personal data has legal problem?

- People have **the freedom from identification.**
- Right to act as **nameless (anonymous) one.**
- Right to **be left alone.**

Case Study: Children Guarding System (Field Experimentation in 2008)



(Quotation from a booklet made by MIC)

Response to the experimentation



One educator says,

“This system is illegal. Children have the right not to be chased by sensors.”

“Children have the right not to obey the orders of parents and teachers”.

“Experiences of escaping from parents, or disobeying teachers, are very important for personal growth.”

Japanese lawyer says,

“I think this is correct from a certain point of view.

This system makes children feel that they are always watched by their parents or teachers. And this system makes children think that they must do only the thing they ordered.

This means that the children **have lost their freedom**.

That is **the chilling effect** which this kind of Network Robot System has“.

Another legal problem... (Side-effect)

This system takes pictures of all people who are accidentally walking near the children.

In Japan, taking pictures of people without permission has a possibility to be judged illegal by the court.

This means that a Network Robot System, which has cameras as its eyes, has a risk to be judged illegal by the court in public area.

Q1) Are sarrogates(visible-type) accepted among people as Urban Service Robots?

Q2) For example, collecting personal data with robots (visible-type) is illegal?

Q3) Smartphone(virtual-type) is fragile in terms of data safety?

Q4)Taking photographs(unconscious-type) in public area is illegal in your country?

Legal problem of collecting personal data

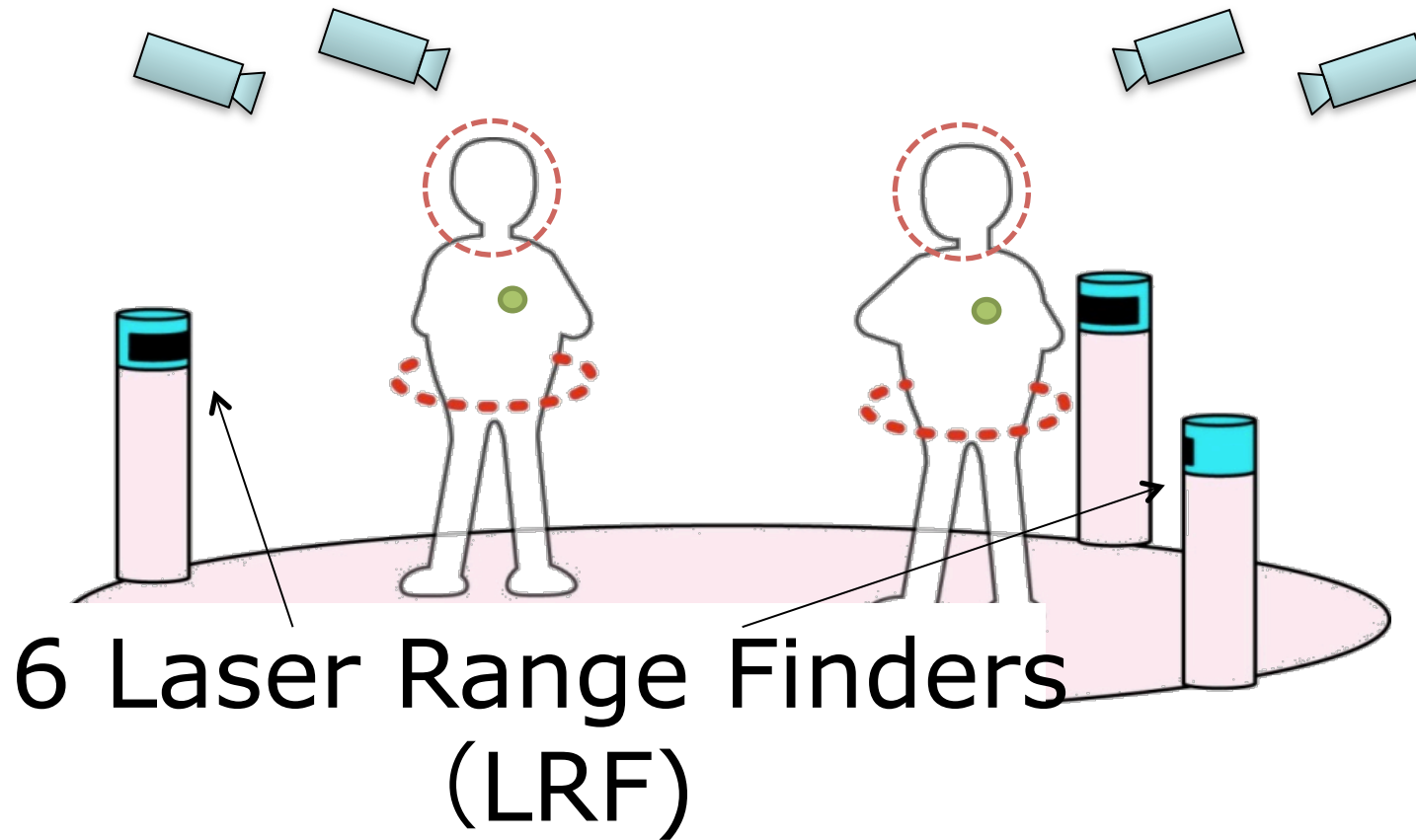
- Taking Pictures
- Hearing Conversations
- Chasing Movements by RFID

➔ might be illegal
without permission

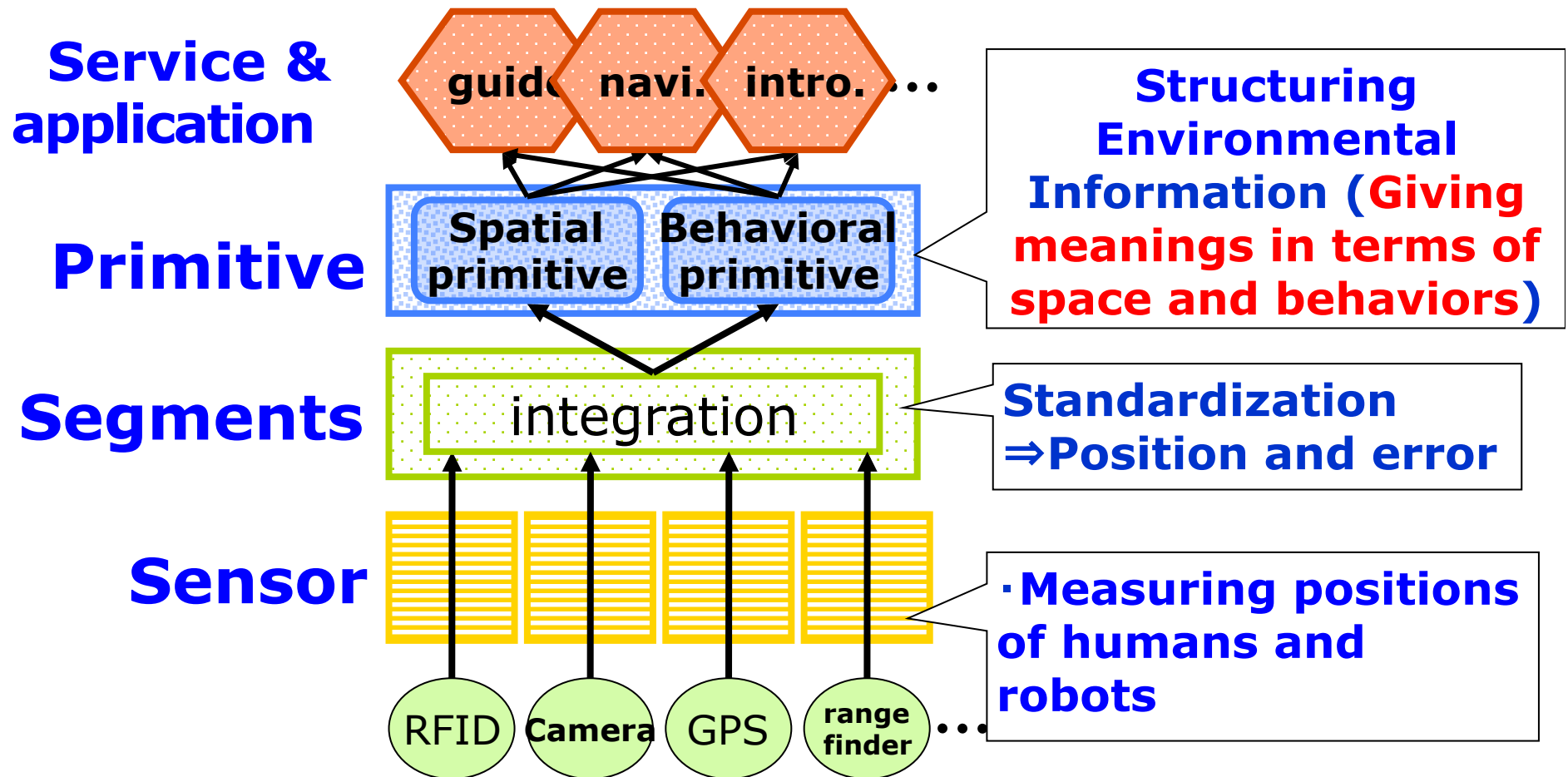


Sensor Network for Observing ^{ATR} Human Positions and Behaviors in 2007-2009

16 cameras



Four-Layer Model for Structuring Environmental Information



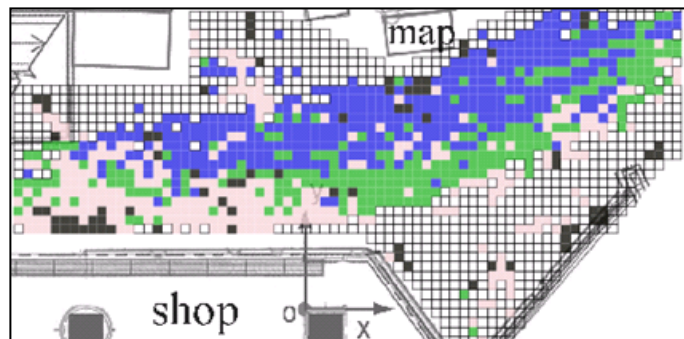
Detecting individual positions and behaviors for more than 20 persons



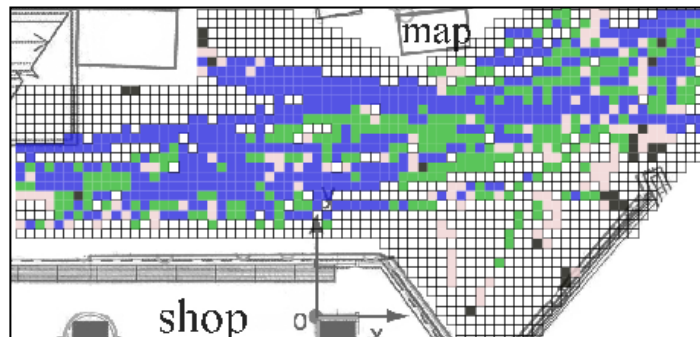
Ambient Intelligence Map

■ Fast-walk ■ Idle-walk ■ Wandering ■ Stopping

Grid map for every one hour



⋮

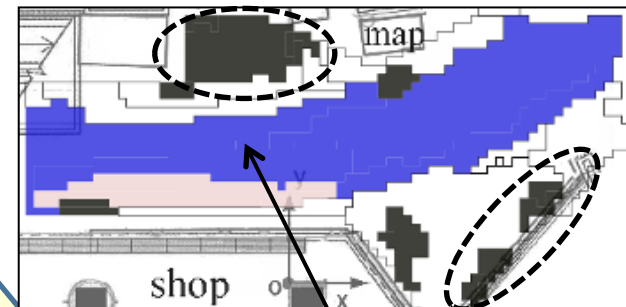


A grid cell = 25cm square

Clustering

Aml map from one week

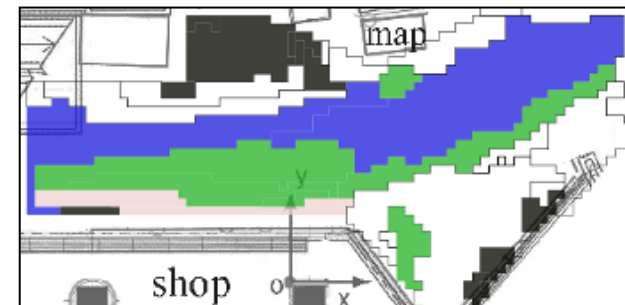
Cluster 1: Weekday 11am-5pm,
Weekend 12am-1pm



⋮

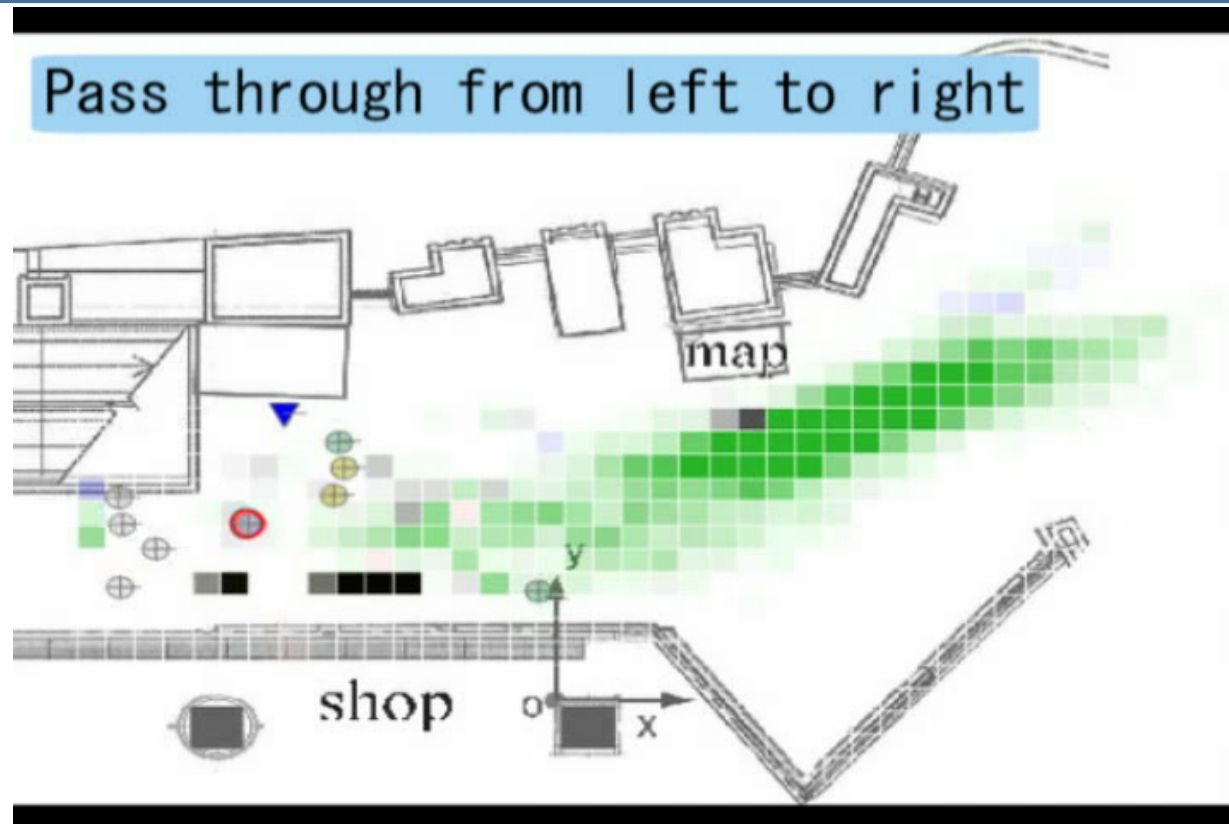
Benches

Cluster 40: weekday 5pm-6pm



Ambient Intelligence Map Anticipation of People's Trajectories and Behaviors

■ Fast-walk ■ Idle-walk ■ Wandering ■ Stopping



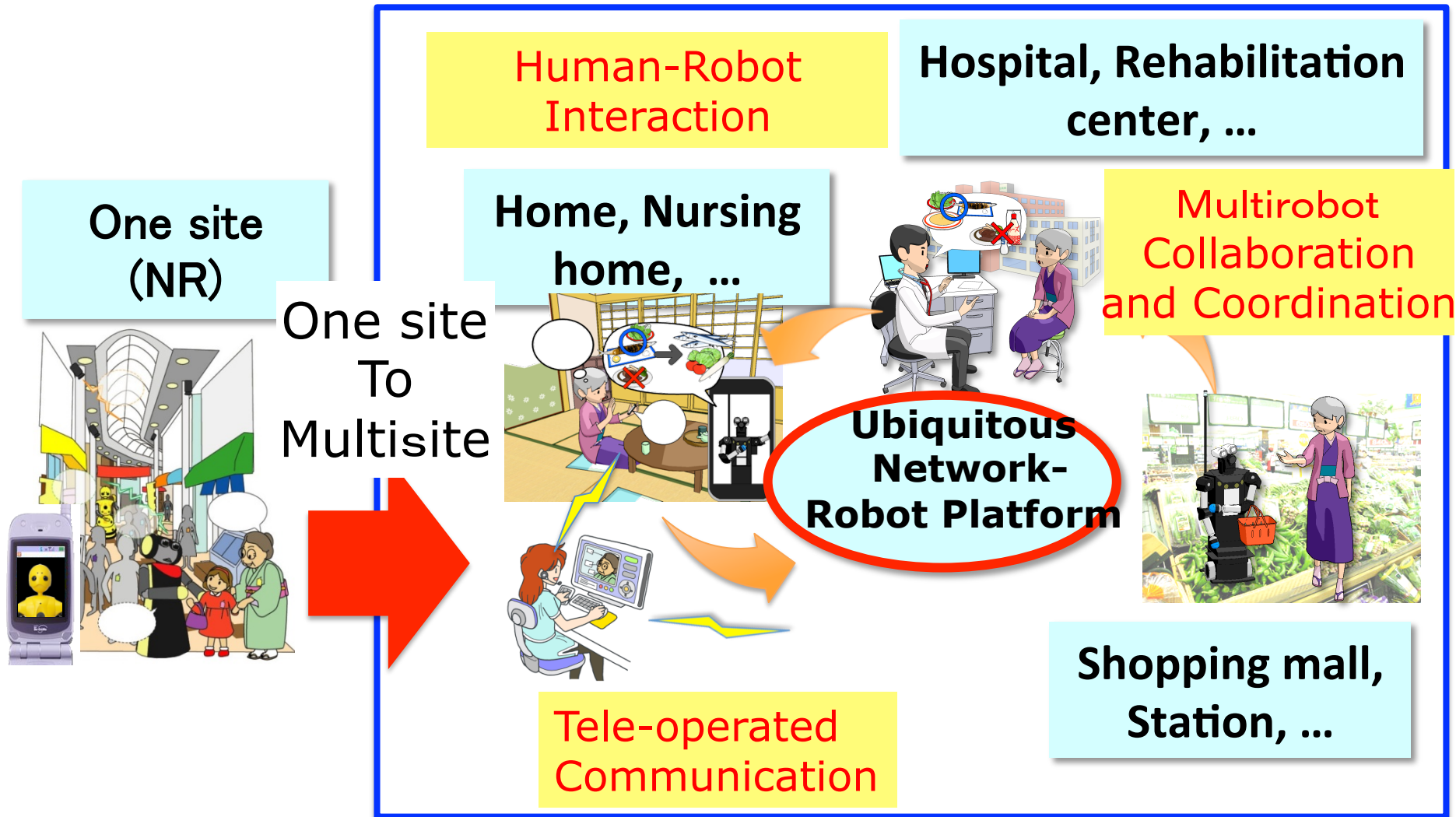
Takayuki Kanda, Dylan F. Glas, Masahiro Shiomi, Hiroshi Ishiguro and Norihiro Hagita, Abstracting People's Trajectories for Social Robots to Proactively Approach Customers, IEEE Trans. on Robotics, Vol.25, No.6, pp.1382-1396, December (2009-12)

- Q1) Are robots(visible-type) accepted among people as Urban Service Robots?
- Q2) For example, collecting personal data with robots (visible-type) is illegal?
- Q3) Smartphone(virtual-type) is fragile in terms of data safety?
- Q4)Taking photographs(unconscious-type) in public area is illegal in your country?
- Q5) Anticipating people positions is illegal?

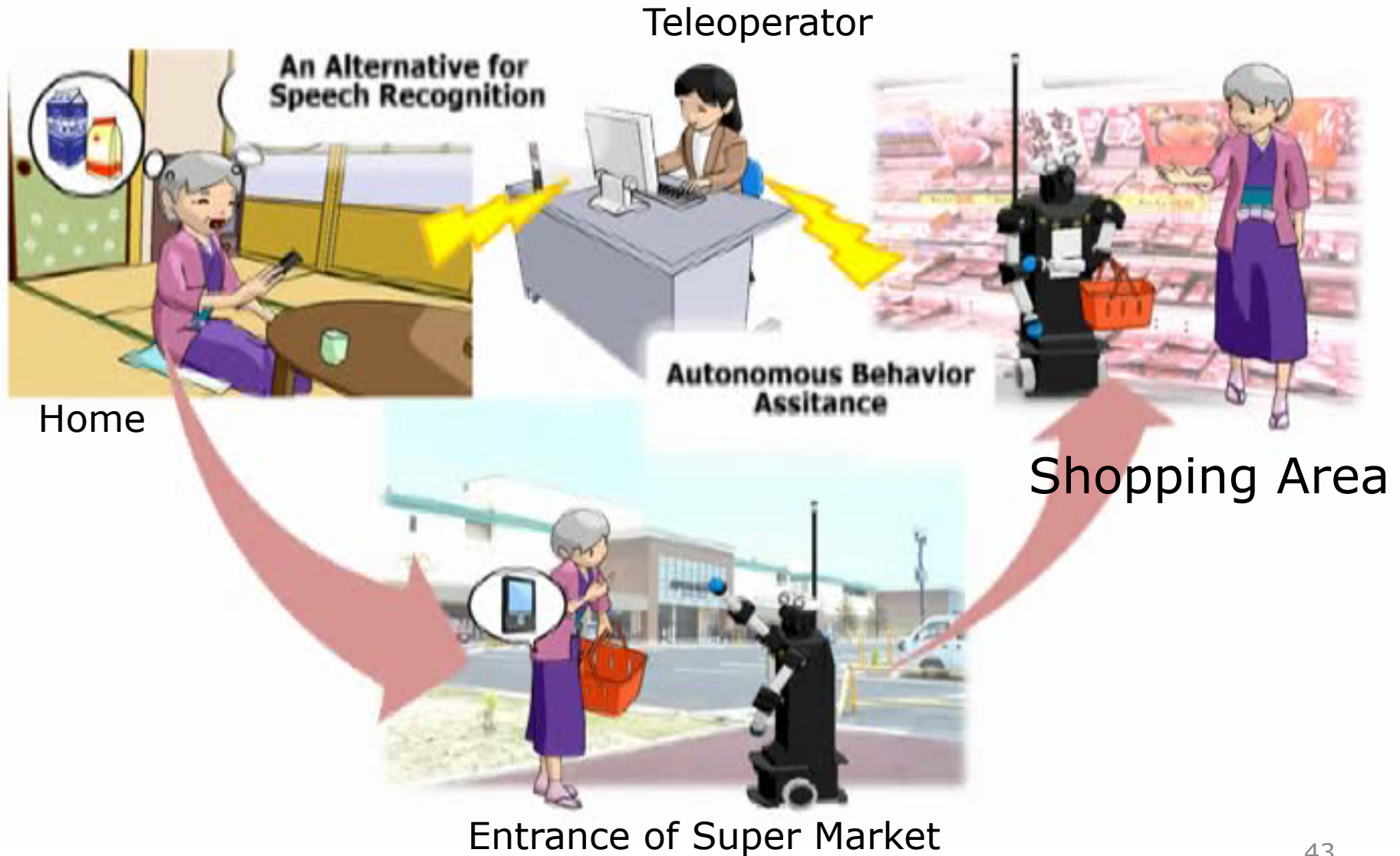
Robotic Services are
the combination of
these three types of
robot.

Ubiquitous Networked Robot Systems -multiple sites-

Ubiquitous Networked Robots for the Elderly



Shopping Support for Elderly Customer



Shopping guidance with NRS over three social activity area **ATR**

Area 1 : Home



Shopping list with a smart phone

Advanced ICT will be available

Area 2 : Entrance of Super Market



Say hello with networked robots

Fully equipped environment in sensor network

Area 3 : Shopping Area



Combination of autonomy and tele-operation

Communication with robots creates emotional happiness to elderly

Networked Robots help elderly customers in a supermarket

<http://networked-robots.cs.umn.edu/node/84>

**Shopping Support for Elderly Customer
with Ubiquitous Networked Robot System**

Shopping support service for elderly
wheelchair users (March, 2011)

<http://networked-robots.cs.umn.edu/>



Legal problem in NRS

People have

- The freedom from identification.
- Right to act as nameless (anonymous) one
- Right to be left alone.

The 28th International conference of data protection and Privacy Commissioners (2006, London)

CLOSING COMMUNIQUÉ

<http://www.privacy.org.nz/28th-international-conference-of-data-protection-and-privacy-commissioners/>

- The '**Surveillance Society**' is **already** with us.
- Surveillance activities can be **well-intentioned and bring benefits**.
- **But unseen, uncontrolled or excessive surveillance activities** also pose risks that go much further than just **affecting privacy**.
- Privacy and data protection regulation is an important safeguard but **not the sole answer**.
- A systematic use of impact assessments should be adopted.
- **The issues are wide ranging** and cannot be taken forward by data protection/privacy regulators alone.
- **Public trust and confidence is paramount**.

Thank you for your kind attention