MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM

The Realization of an Avatar-Symbiotic Society where Everyone can Perform Active Roles without Constraint

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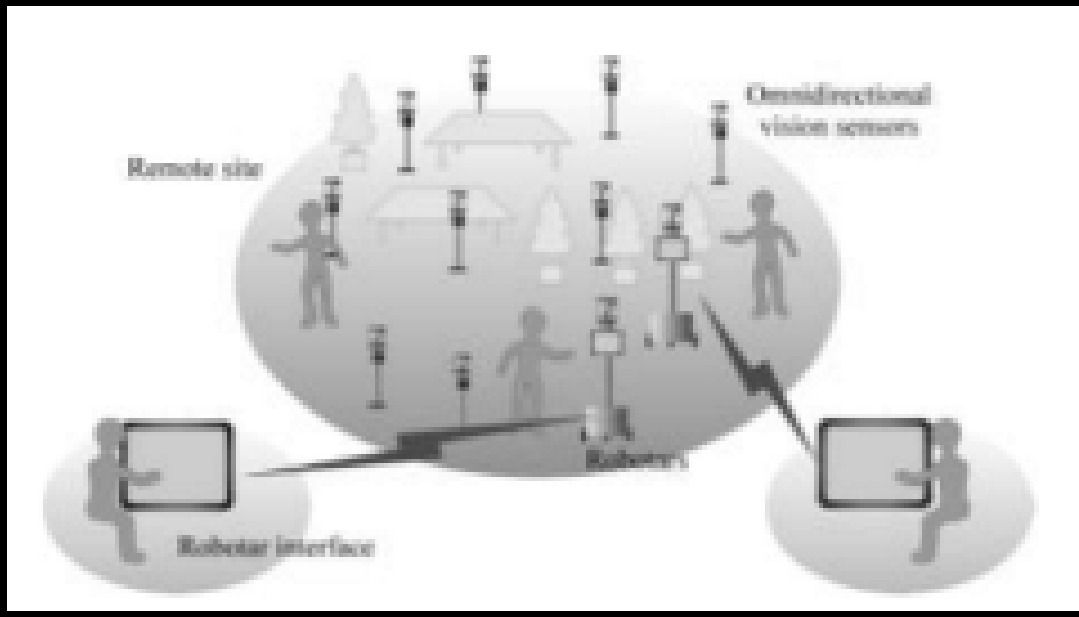
The origin of the Avatar

Teleoperated Robot in 1999



H. Ishiguro, M. Trivedi, Integrating a perceptual information infrastructure with robotic avatars: A framework for tele-existence, Int. Conf. Intelligent Robots and Systems 1999, pp. 1032-1038.

Geminoid:
Ishiguro's Teleoperated Android

Geminoid and the Operator

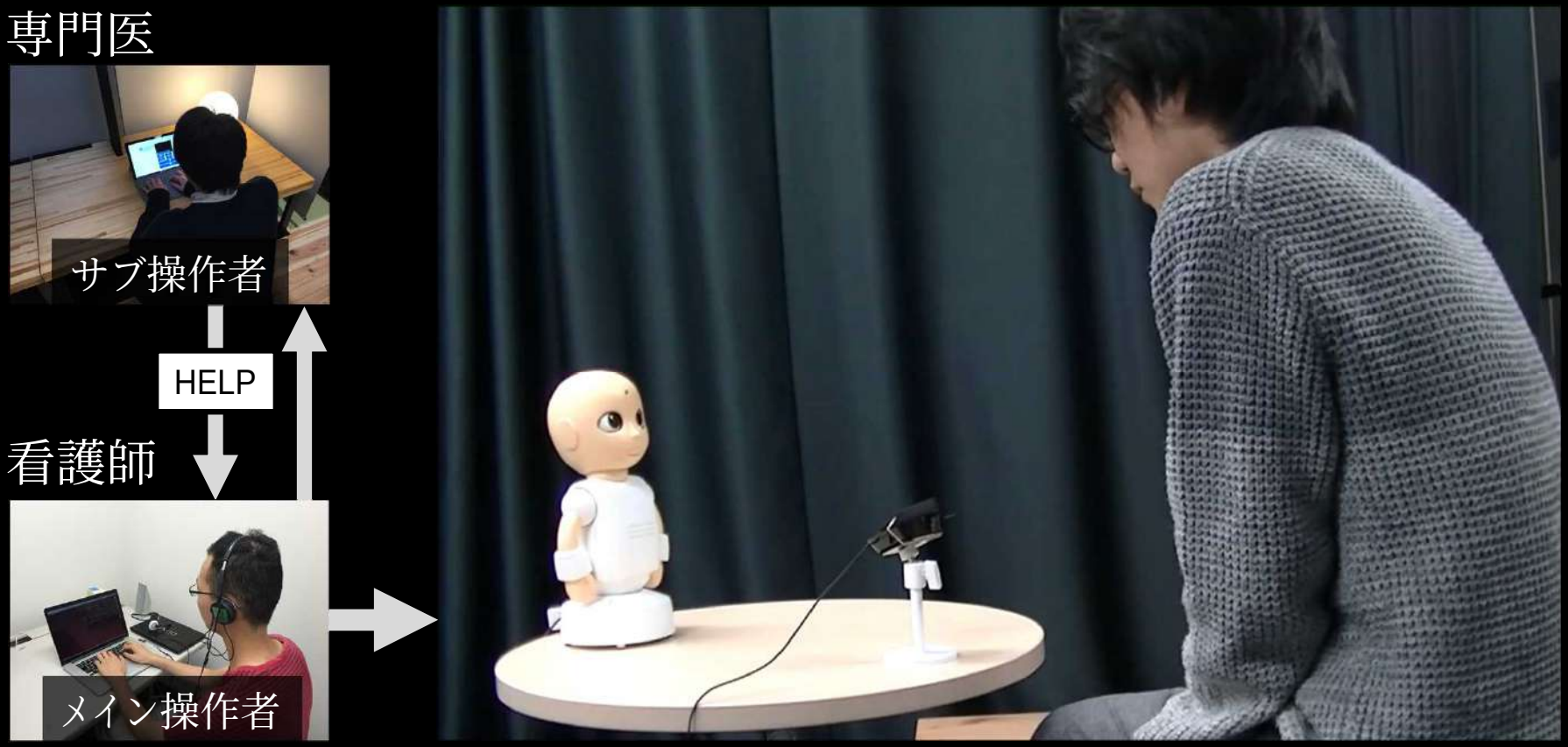
Internet

Operator

Meeting by Geminoid

Telenoid: Teleoperated robot to interact with imagination

CommU:
Teleoperation by integrating the abilities of two people



Technologies to Make the Avatars Intelligent and Autonomous

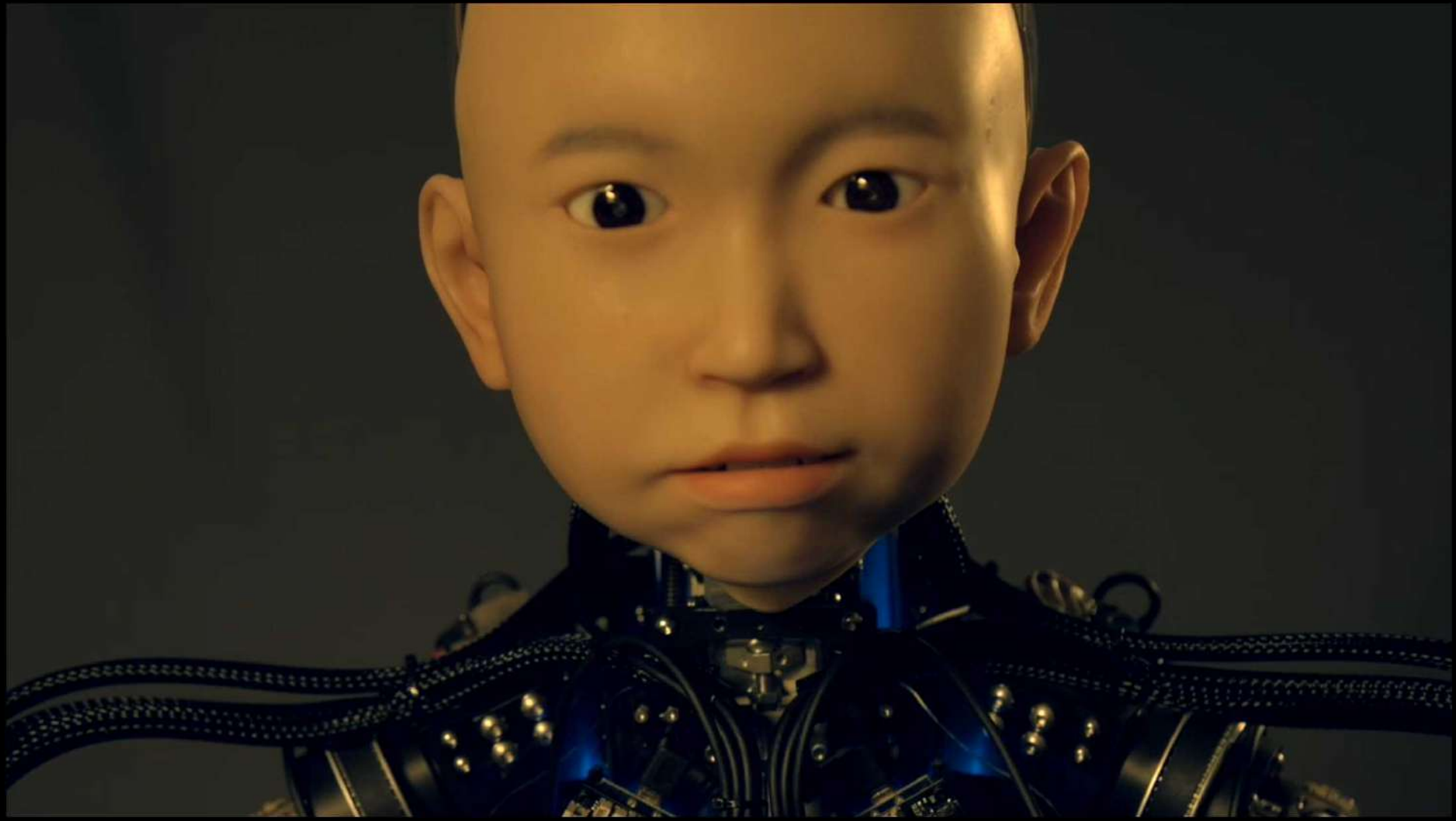
CommU:
Robot System Consisting of Two Robots for continuously interacting with elderlies

with
Yoshikawa

ERICA:
Autonomous Conversational Android

Ibuki: with Nakata

A Robot developed in the Society



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By 2050, realize a society in which people are free from the constraints of body, brain, space, and time.

AVATAR SYMBIOTIC SOCIETY

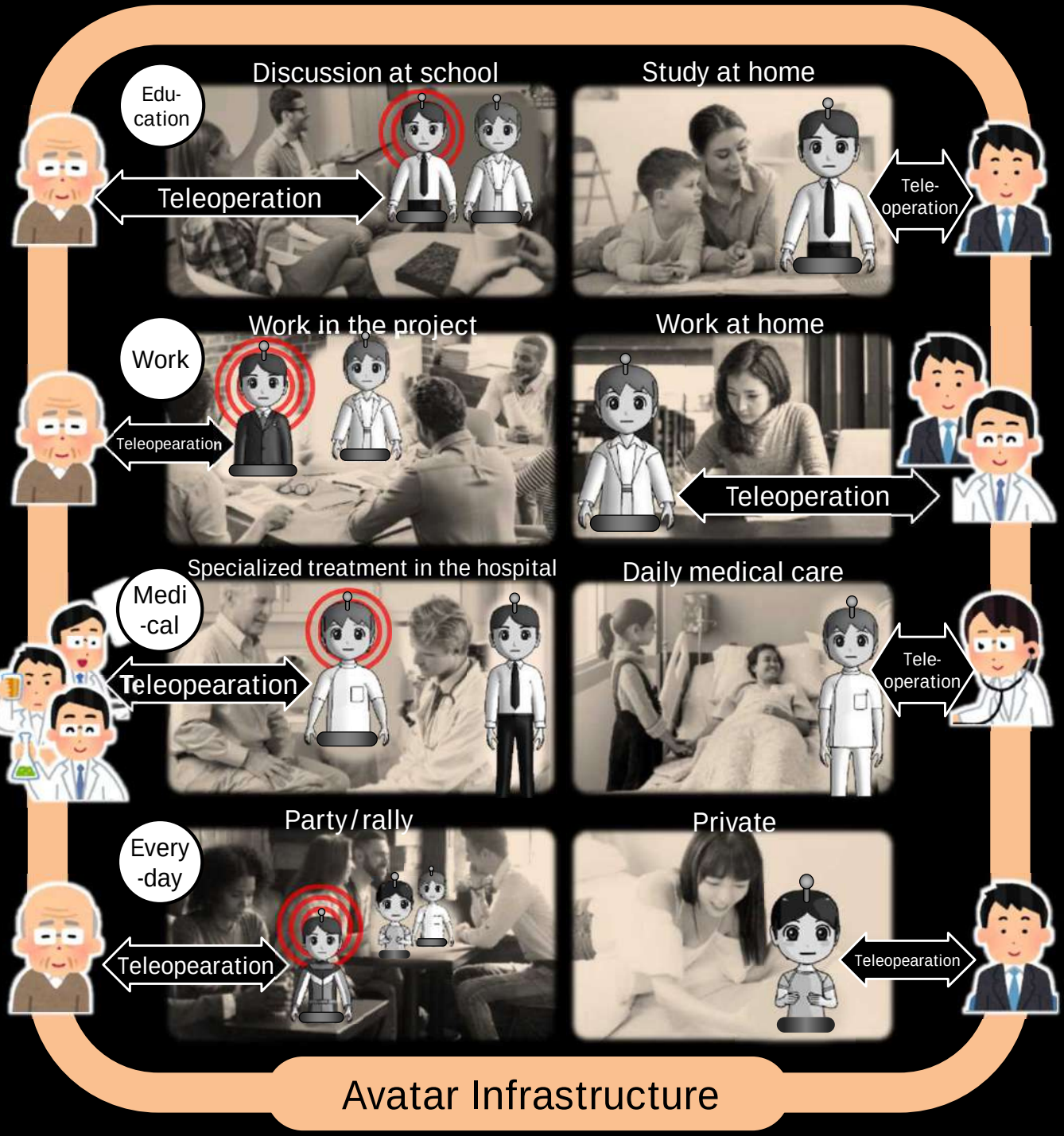
The Realization of an Avatar-Symbiotic Society where Everyone can Perform Active Roles without Constraint

This project aims to realize an avatar-symbiotic society in which CAs allow everyone to perform active social roles without constraint. Through the teleoperation of multiple CAs that can fully transmit the user's actions, intentions, and reactions in scenarios which feature hospitality-rich dialogue, the user will be able to take part in various social activities (work, education, medical care, daily life, etc.).

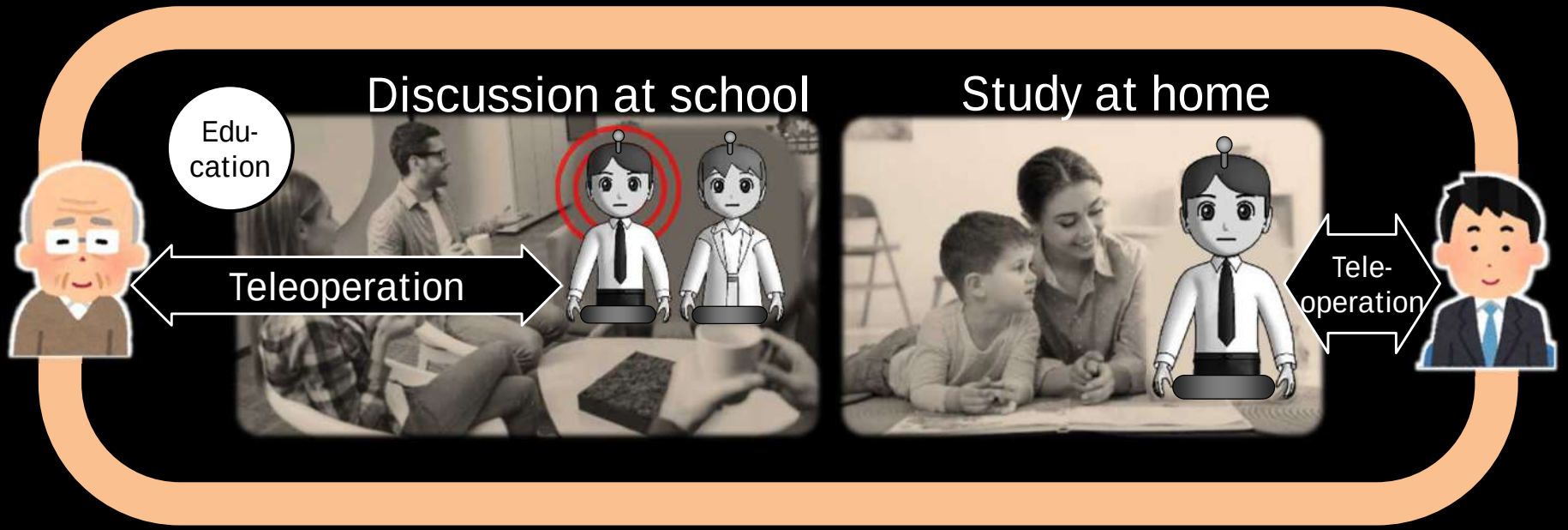
By 2050, our lifestyles will have dramatically changed. We will have greater freedom in our choice of location and how we spend our time, and technological advances will have enhanced our abilities. Our goal is to develop and implement avatar-symbiosis within a balanced society.

Future society in 2050

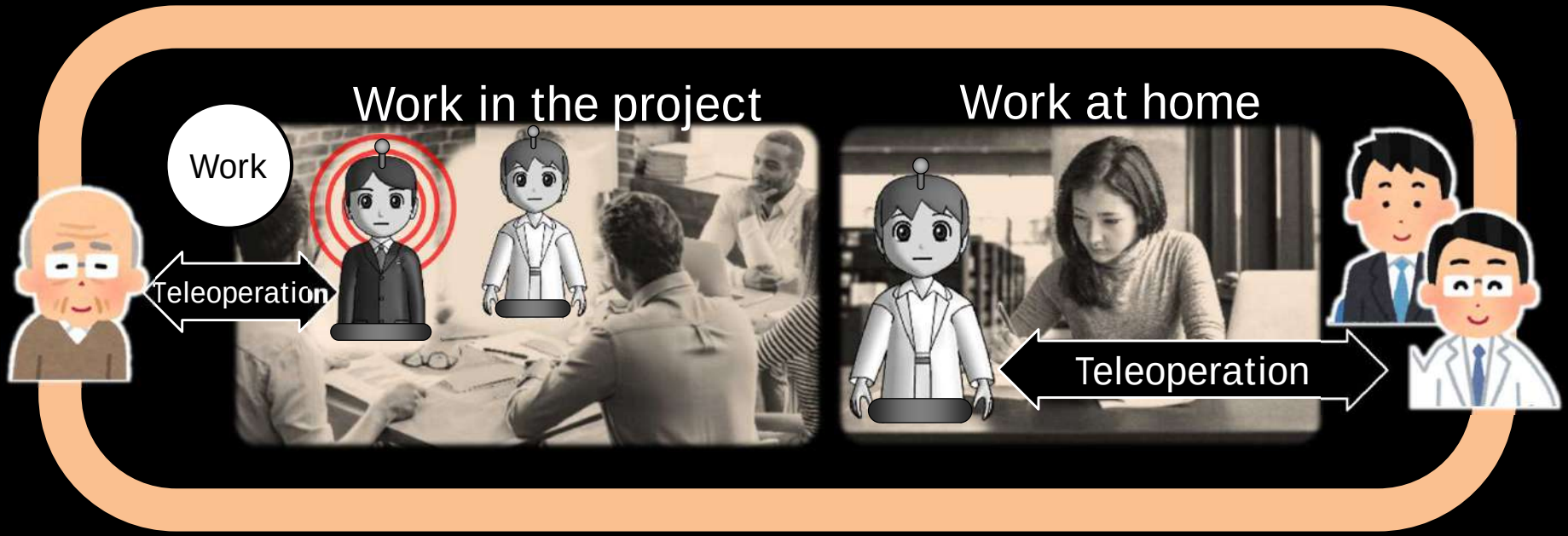
- Anyone, including the elderly and people with disabilities , will be able to freely participate in various activities with abilities beyond ordinary people while expanding their physical, cognitive, and perceptual abilities using a large number of CAs .
- Anyone will be able to work and study anytime, anywhere, minimize commuting to work, and have plenty of free time.



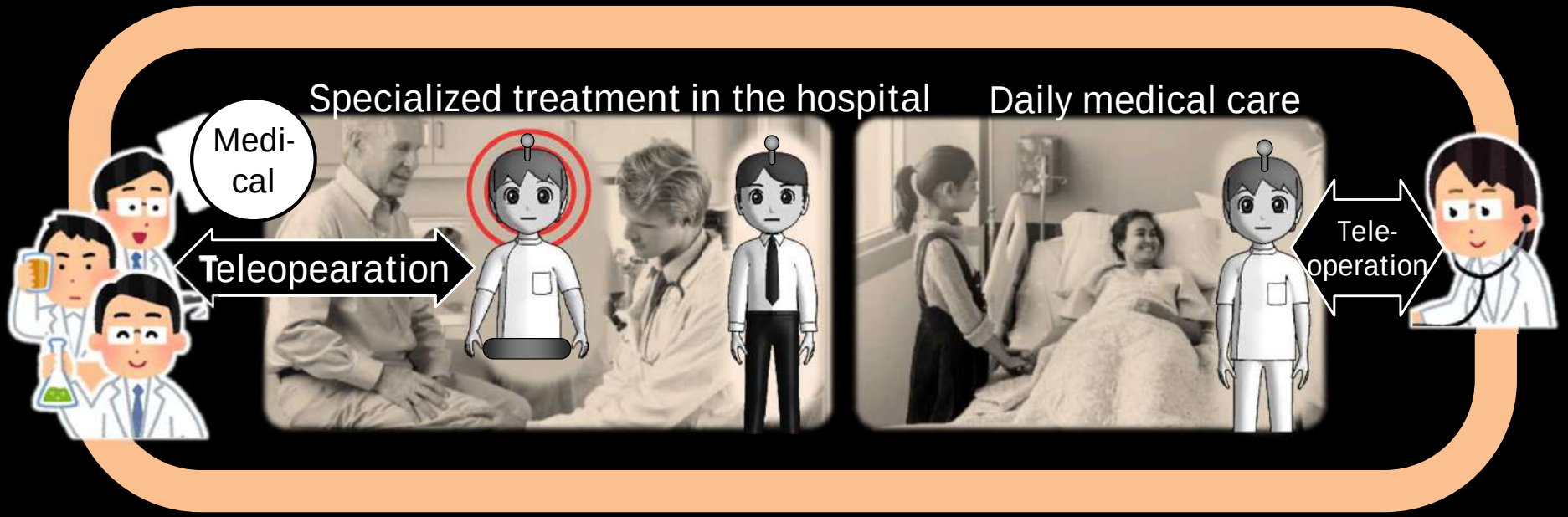
Work


Discussion at school
Study at home
Edu-
cation
Teleoperation
Tele-
operation

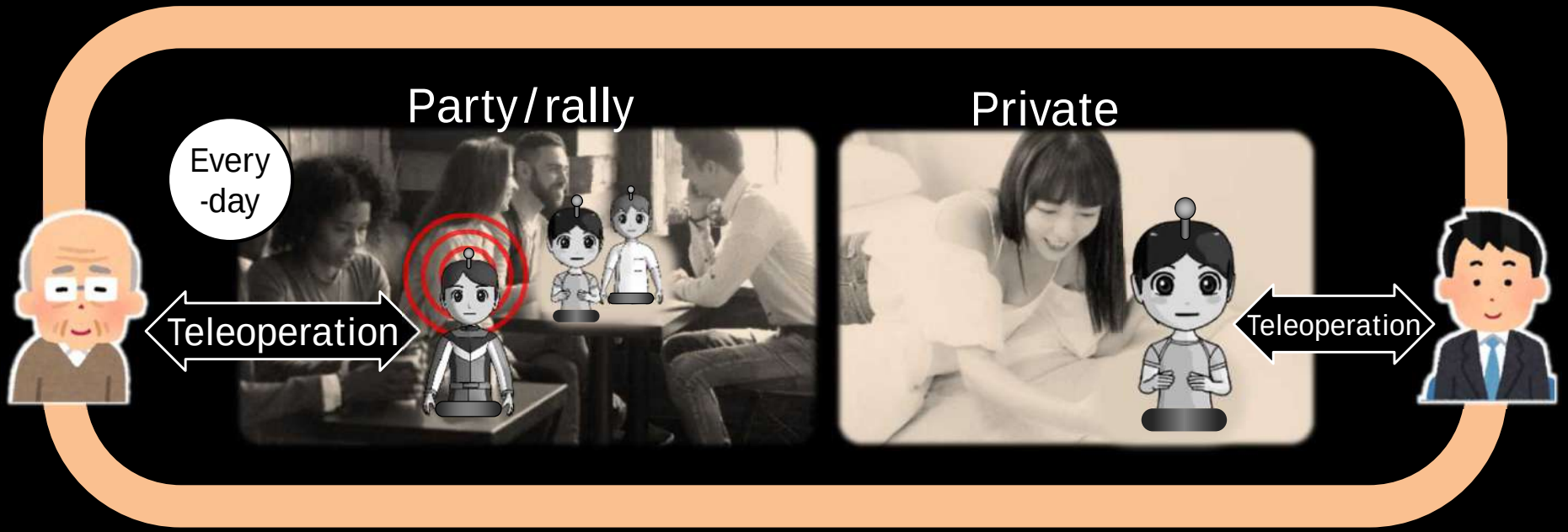
Work


Work in the project
Work at home
Work
Teleoperation
Teleoperation

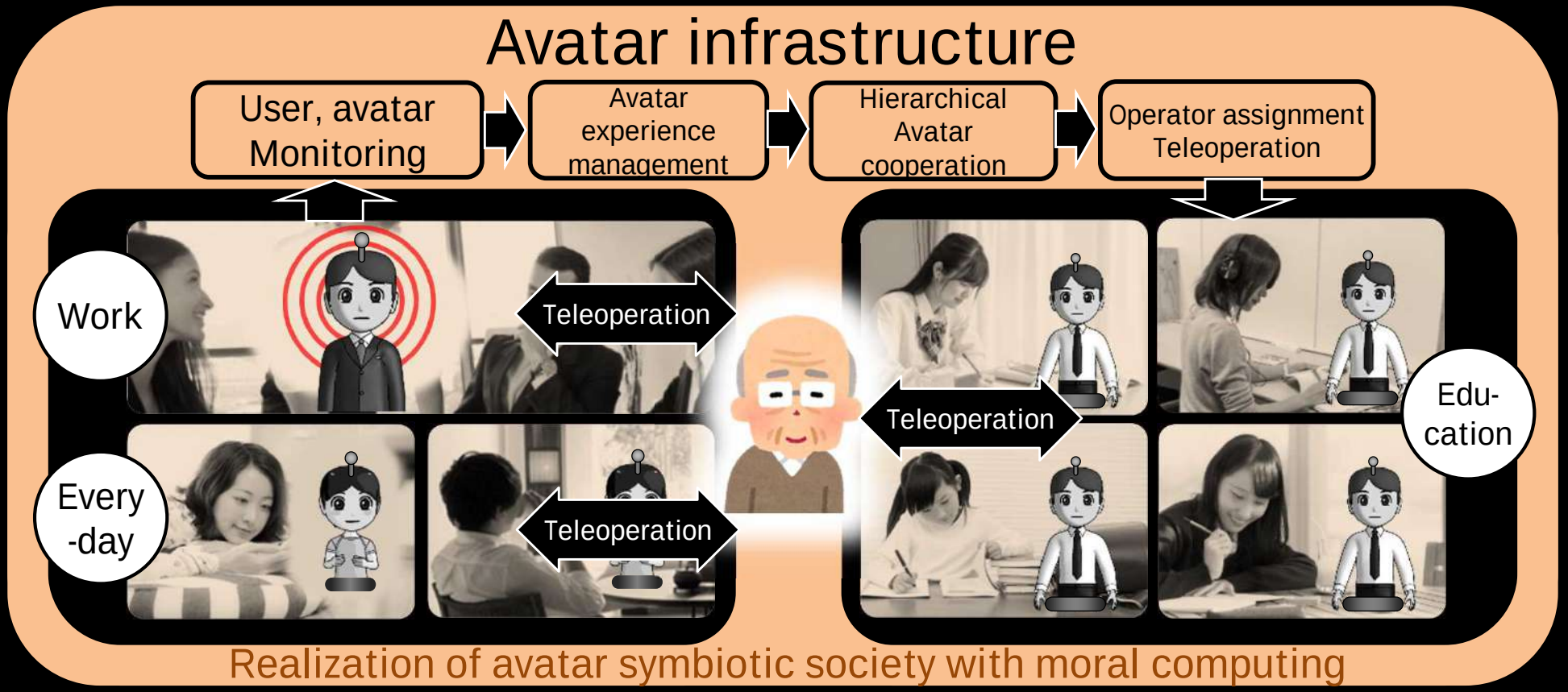
Medical


Specialized treatment in the hospital
Daily medical care
Medi-
cal
Teleopearation
Tele-
operation

Everyday


Party / rally
Private
Every
-day
Teleoperation
Teleoperation

Avatar Infrastructure



Future School Teacher (40-year-old woman)

A woman who lives freely with two personalities, one who enjoys herself alone and the other who supports many people as a teacher. She likes to take care of people. On the other hand, she also likes traveling alone. Lives in Hawaii.

- In the morning, she travels around the world using avatars at a nearby facility. She meets various people while taking a walk in various cities.
- She travels anonymously to travel freely and build relationships freely Enjoy the travels as a different person from usual.
- For lunch, she eats at a nearby cafe with a few friends including avatars.
- In the afternoon, she works as teachers by using avatars. She mainly teaches math and physics. Students are all over the world.
- Since the avatar automatically teaches the fixed learning pattern, about 80% of the conversations are autonomous, but if a problem that is difficult to explain arises, it will be handled by the operator. In addition, the avatar always provides polite responses.
- Although some children have autism and depression, but she can use avatars to effectively teach them.
- She eats dinner with her friends who use avatars.
- Before the bedtime, she transfers to her avatar and spends time with her friend, her lifelong spiritual partner who lives away from her.
- With the augmented reality function of the avatars, the world of only two people is reproduced from each viewpoint.

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Future Security Guard (70-year-old man)

An elderly person who uses avatars to live in both a Japanese village and a Brazilian city. His job is to manage buildings in Brazil. He lives in the countryside of Japan as a couple.

- In the morning, he strolls around the Japanese village where he lives. Many people from all over the world travel by avatars in the village, and he enjoys interacting with them.
- For lunch, he uses a cute-looking avatar to chat with travelers about culture.
- From the afternoon, he uses the time difference to operate a large number of avatars with several colleagues to guard buildings and areas in the city of Brazil at midnight.
- Sometimes he gets angry, but he treats like a gentleman with the avatar's moral computing capabilities.
- In an emergency such as an earthquake, skilled operators from all over the world gather to link a large number of avatars and guide people efficiently.
- In normal times, avatars also talk to people in the city. In the city, the are favorably accepted as avatars that brings safety and security. He is also proud of that.
- He eats dinner with his wife who lives together. Occasionally grandchildren's avatars participate.

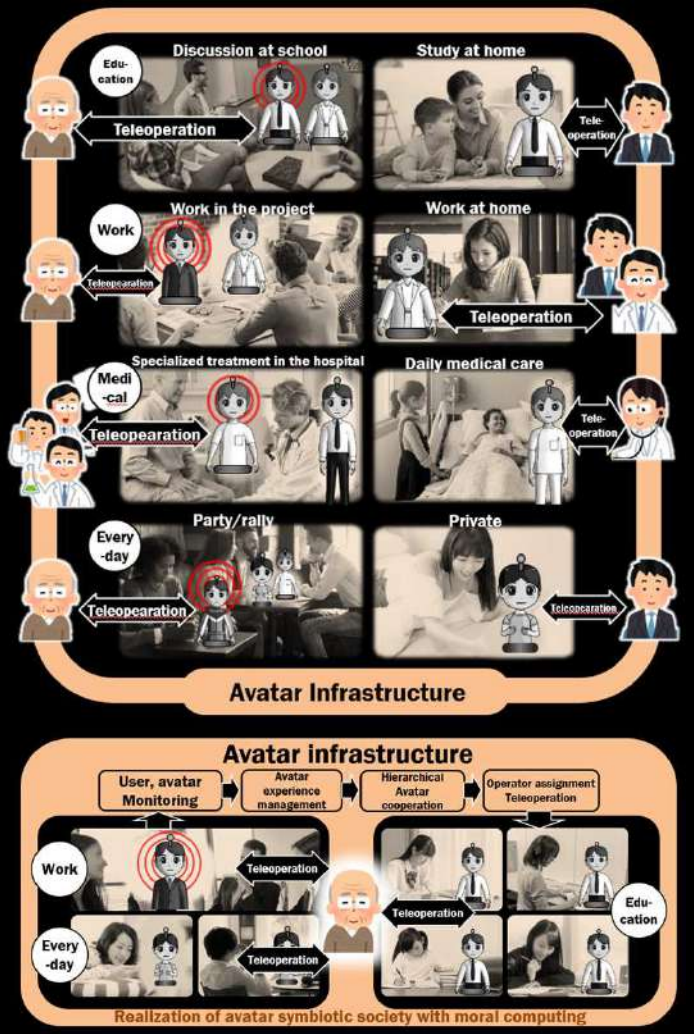
Development goals for 2050

CA Life

- By 2050, we will develop technology that allows anyone who wants to extend their physical, cognitive and perceptual abilities to the top level, and spread a new lifestyle based on social conventions.

CA Infrastructure

- By 2050, we will develop technology for executing large-scale and complex tasks by combining a large number of avatars teleoperated by multiple people and robots, and build the foundation necessary for their operation.



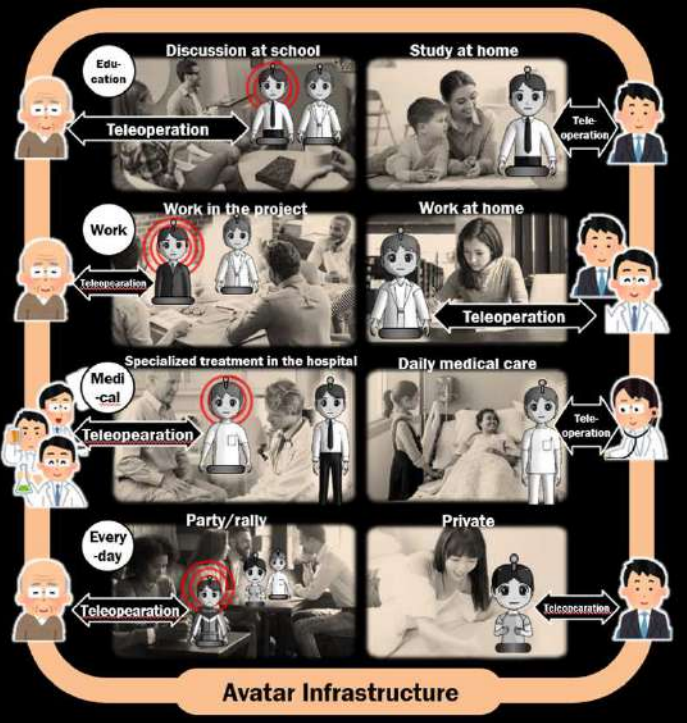
Development goals for 2030

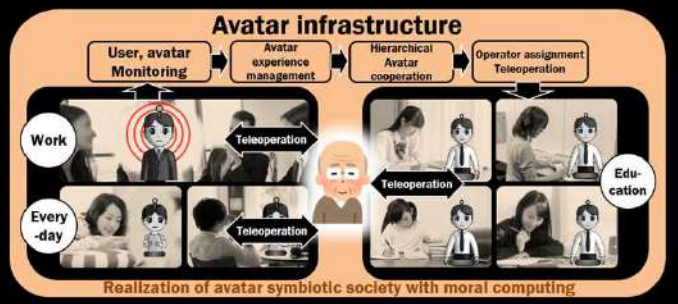
CA Life

- By 2030, we will develop technologies that can expand physical, cognitive, and perceptual abilities for specific tasks, and propose new lifestyles based on social conventions.

CA Infrastructure

- By 2030, we will develop technologies that allow one person to operate 10 or more avatars for one task with the same speed and accuracy as one avatar, and build the foundation necessary for its operation.

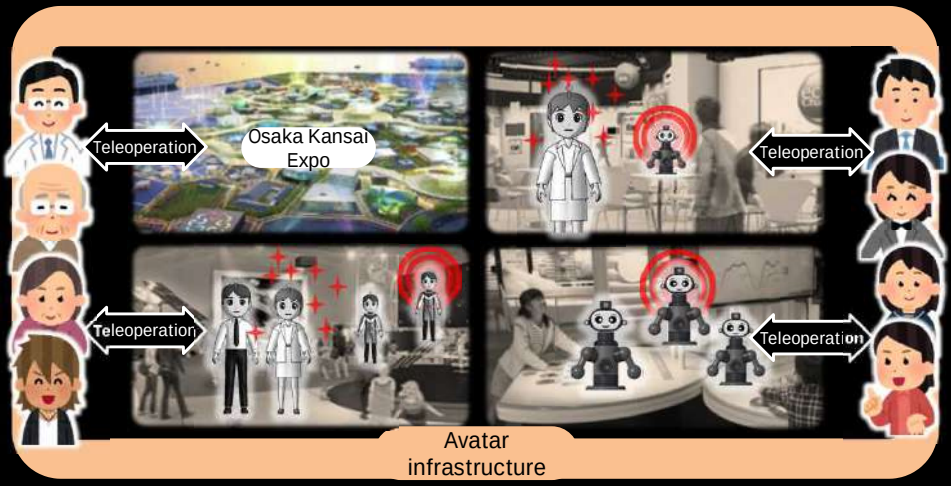




Development goals for 2025

- At public places and large-scale events such as the Osaka Kansai Expo, housewives, househusbands, elderly people, etc. operate CAs and engage in hospitality dialogue activities according to the user's nationality, language, gender, and age group.
- In a wide range of environments such as the Osaka Kansai Expo, we will work efficiently while coordinating CAs.

➡ Solving waiting-list child problems, school child problems, employment problems for elderly and housewives/househusbands
Realization of a society resistant to infectious diseases



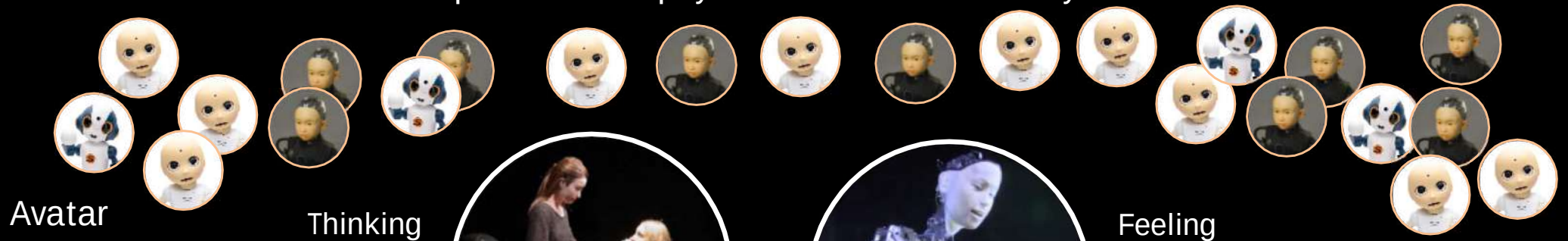
Use of Avatars at the Expo

Thematic Project Producer

OSAKA, KANSAI, JAPAN
EXPO
2025

Ishiguro Pavilion ‘Amplification of Lives’

Participation to the physical and virtual sites by avatars



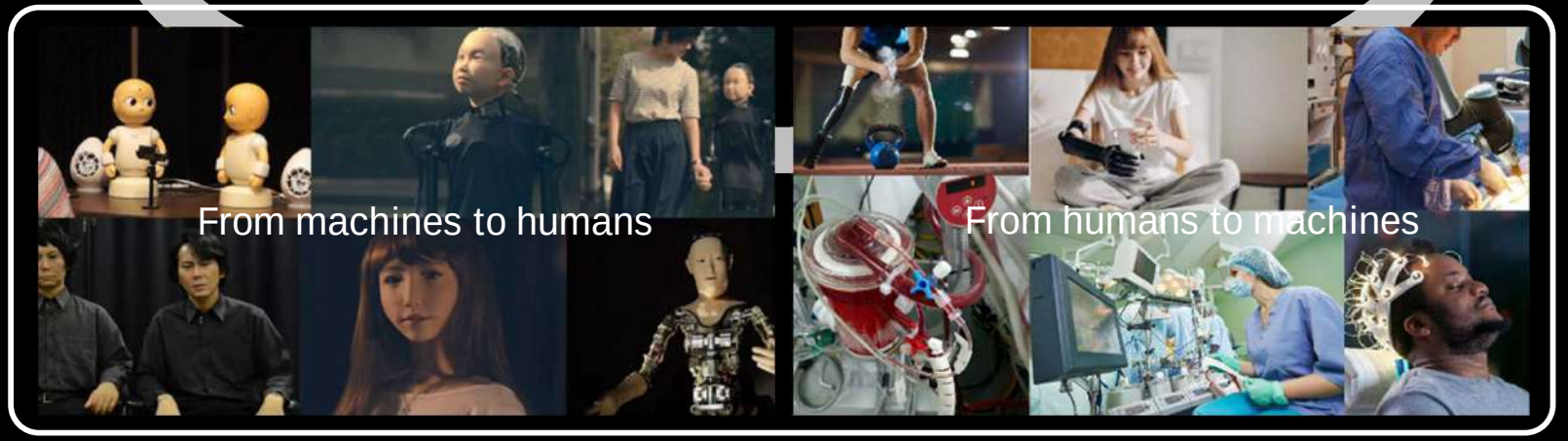
Avatar

Thinking lives

Feeling lives

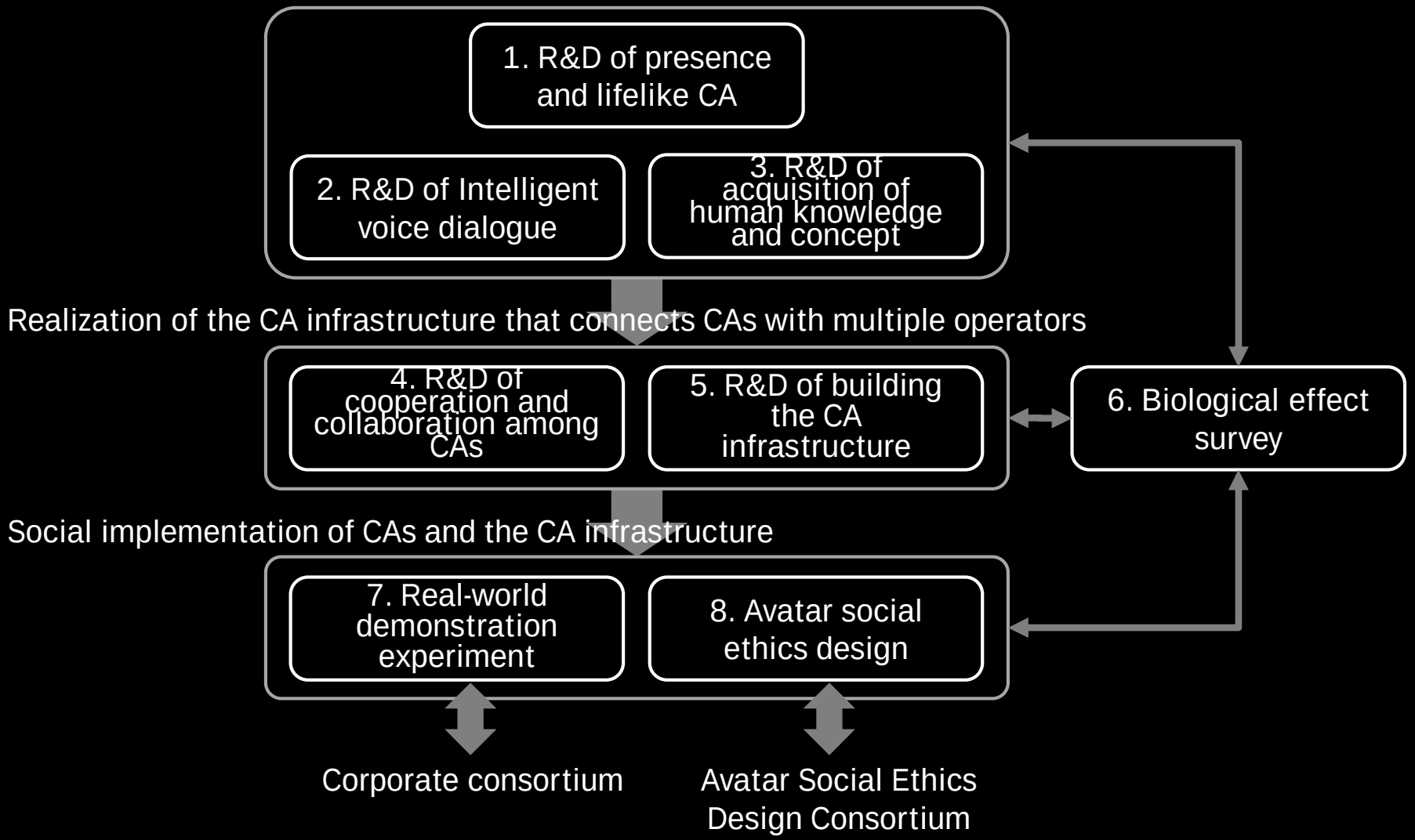
Experience of Lives

Exhibition of lives



R&D Items

Realization of high-performance CA that can be operated as intended

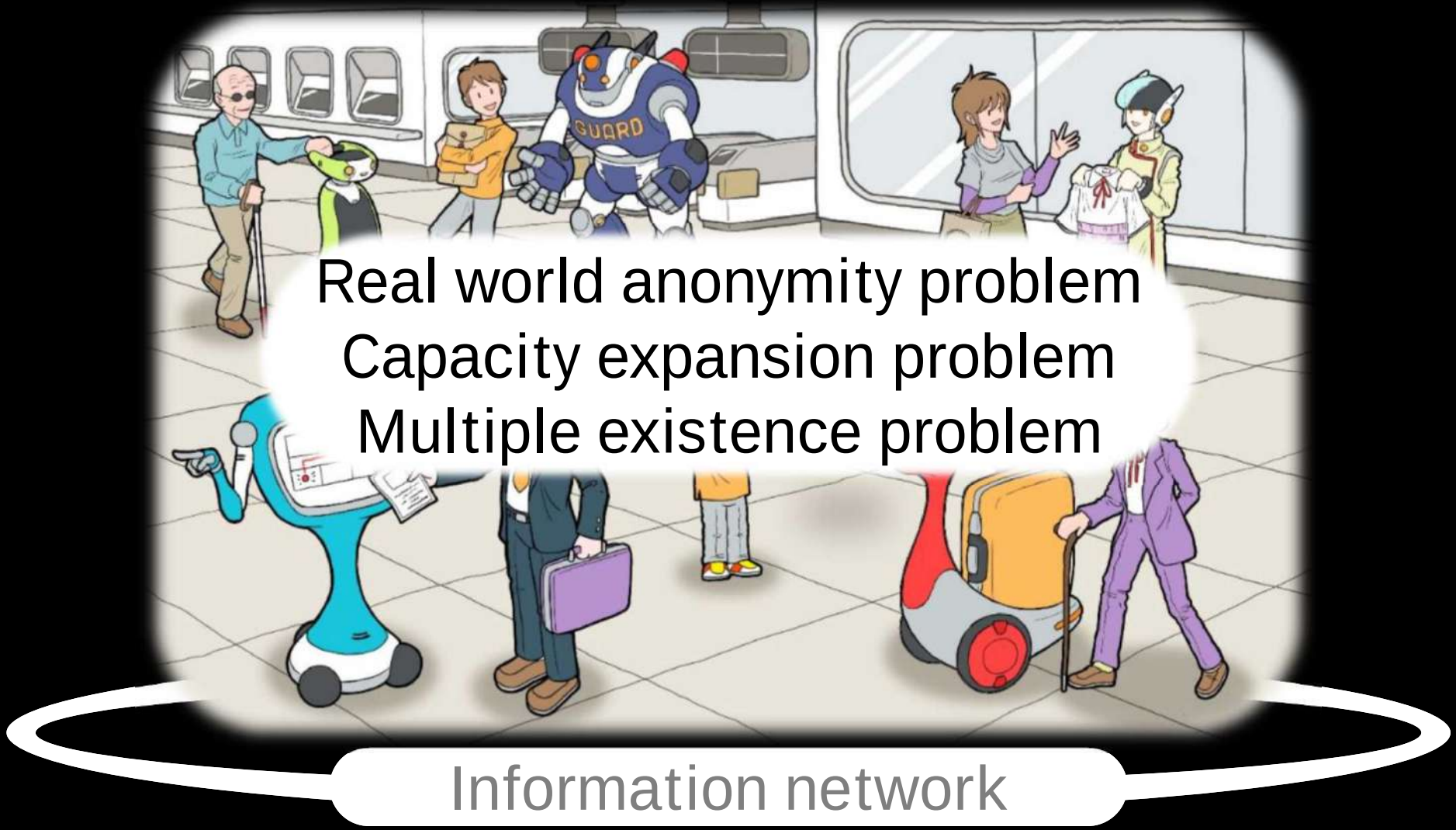


Research System

Project manager	Hiroshi Ishiguro (Osaka Univ.)

R&D Items	Group leader and performer
1. R&D of presence and lifelike CA	Ishiguro, Yoshikawa (Osaka U.), Ogawa (Nagoya U.), Nakata (U. Electro-Commu.), Shiomi (ATR), Minato, Nakamura (RIKEN)
2. R&D of Intelligent voice dialogue	Kawahara (Kyoto U.), Saruwatari (U. Tokyo), Higashinaka (Nagoya U.), Li (Nagoya Ins. Tech.)
3. R&D of acquisition of human knowledge and concept	Harada, Kurose, Mukuta (U. Tokyo), Lin (RIKEN), Suzuki (Tohoku U.)
4. R&D of cooperation and collaboration among CAs	Nagai, Hirata (Osaka U.) , Nakamura (U. Electro-Commu.), Sugiura (Keio U.), Taniguchi (Ritsumeikan U.), Suzuki (Kanazawa U.)
5. R&D of building the CA infrastructure	Miyashita, Ustumi (ATR), Yoshimi (Shibaura Ins. Tech.)
6. Biological effect survey	Kawaoka (Kyoto U.), Izumi (Kyusyu U.), Haruno (NICT), Sumioka (ATR), Nakae (Osaka U.)
7. Real-world demon-stration experiment	Ishiguro, Nishio, Murata (Osaka U.), Miyashita (ATR), Kumasaki (N. C. Neuro. Psyc.)
8. Avatar social ethics design	Nakano (Seikei U.), Kanda (Kyoto U.), Kukita (Nagoya U.), Ishii (Chuo U.), Shimpo (Keio U.), Yuasa (Meiji U.)

CA system realizes the virtualized real world



CA diversifies people and society People are worth living in each