Moonshot International Symposium for Goal 1 and Goal 3

Session 3 : Overview of the program on

Moonshot Goal 1

Realization of a society in which human beings can be free from limitations of body, brain, space, and time by 2050.

March 28th, 2021, JST

Dr. Norihiro Hagita,

Chair and Professor,

Art Science Department, Osaka University of Arts

Moonshot R&D Program

Bold

disruptive

A bold new program for creating disruptive innovation,
decided by Plenary session of Council for Science, Technology and Innovation (“CSTI”),
the Ministry of Education, Culture, Sports, Science and Technology (“MEXT”),
with Japan Science and Technology Agency (“JST”) in Japan.

We will tackle the challenges facing future society
through ambitious goal-oriented research projects,
leaping beyond the limits of conventional technology without fear of failure.

Ambitious

without fear of failure

The Moonshot Goals

MOONSHOT RESEARCH & DEVELOPMENT PROGRAM
JST Japan Science and Technology Agency

Goal 1:	Realization of a society in which human beings can be free from limitations of body, brain, space, and time.
Goal 2:	Realization of ultra-early disease prediction and intervention.
Goal 3:	Realization of AI robots that autonomously learn, adapt to their environment, evolve in intelligence and act alongside human beings.
Goal 4:	Realization of sustainable resource circulation to recover the global environment.
Goal 5:	Creation of the industry that enables sustainable global food supply by exploiting unused biological resources.
Goal 6:	Realization of a fault-tolerant universal quantum computer that will revolutionize economy, industry, and security.
Goal 7:	Realization of sustainable care systems to overcome major diseases by 2040, for enjoying one's life with relief and release from health concerns until 100 years old.

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JST

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Why do we start Moonshot Goal 1 program?

To overcome the challenges of a declining birthrate, aging population and associated labor shortage,

The key is to realize a society free from the limitations of body, brain, space, and time
and allow people with various backgrounds and values – such as the elderly and those with responsibilities for nursing and childcare – to actively participate in society.

Vision of a Society in 2050

MOONSHOT RESEARCH & DEVELOPMENT PROGRAM
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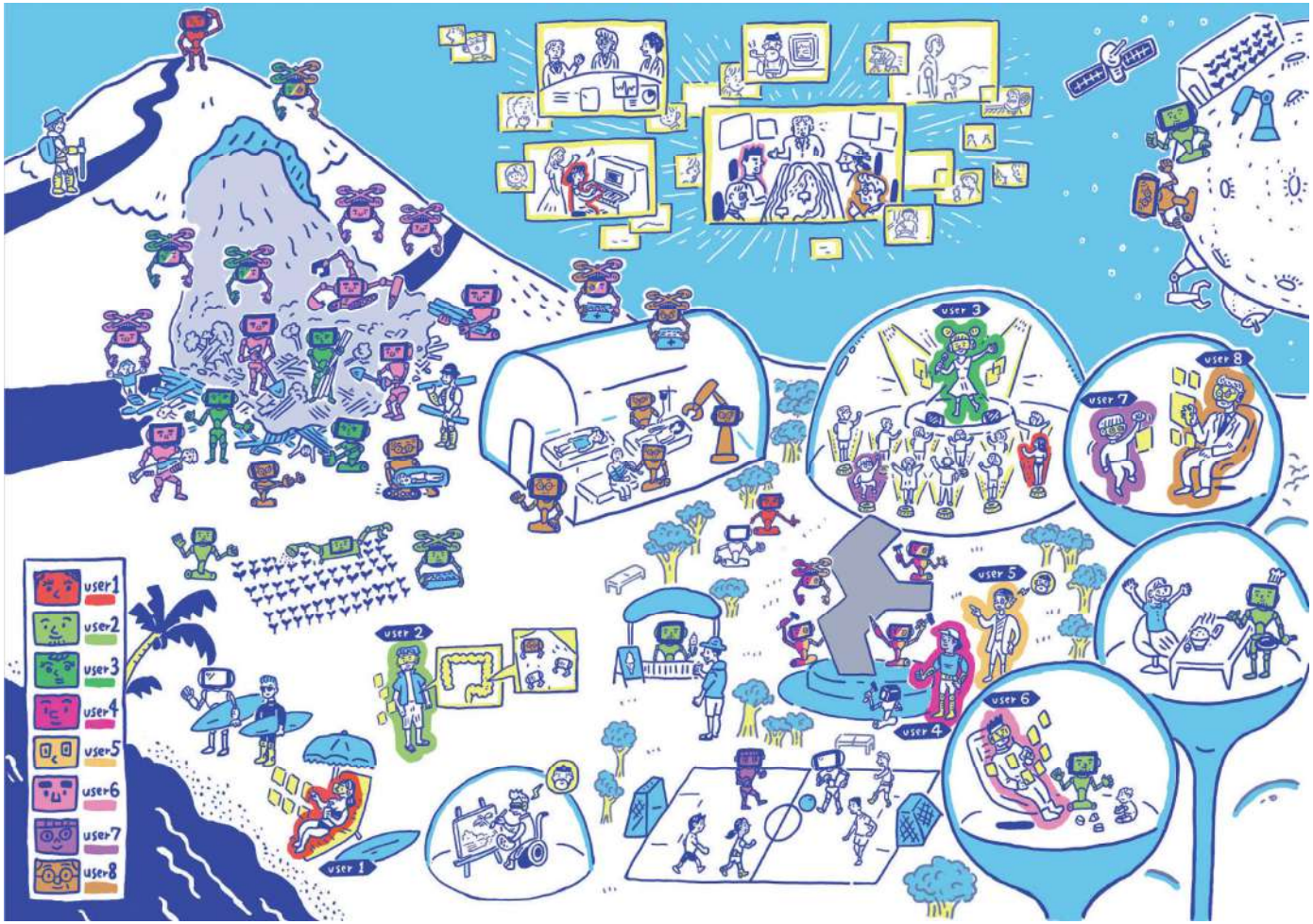
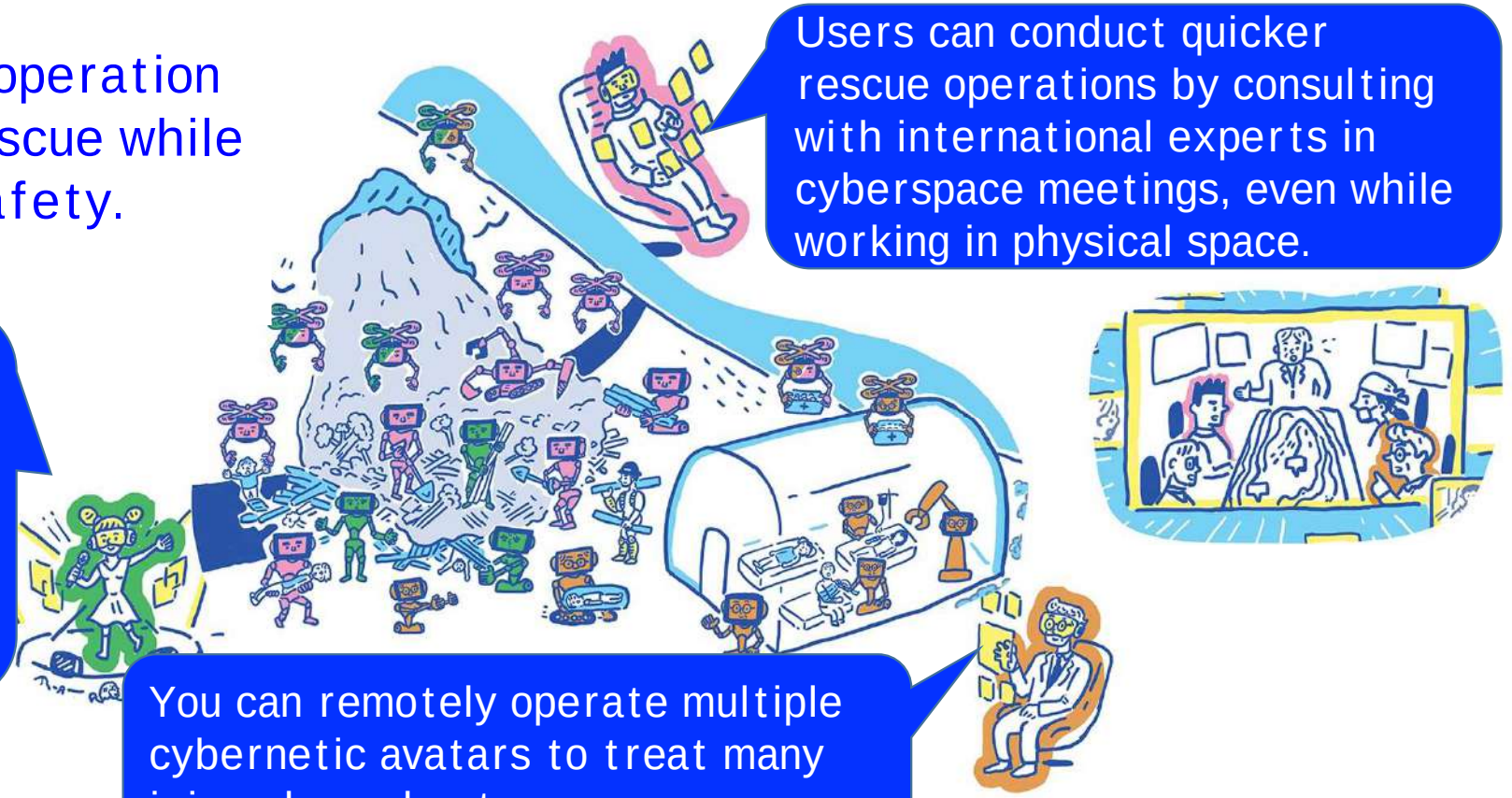


Cybernetic avatar technology will make work and play more accessible for everyone.

SCENE 1 Disaster relief

More than a thousand cybernetic avatars operated by teleoperators will perform large-scale and complicated mission in disaster sites.

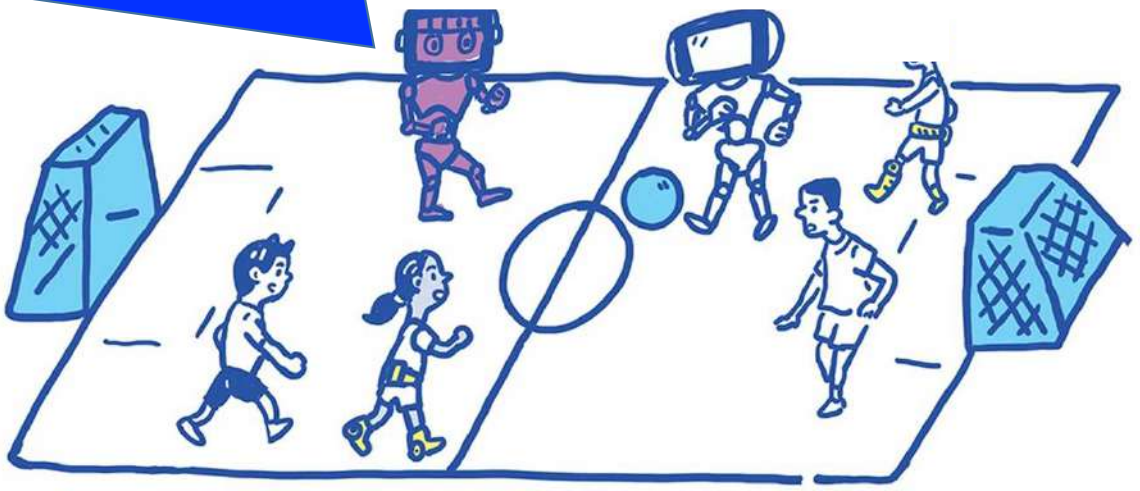
Professionals in teleoperation will conduct rapid rescue while ensuring their our safety.



SCENE 2 Enjoy sports together

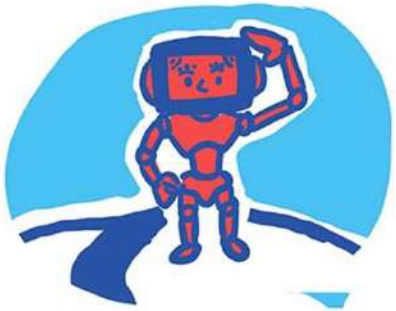
With cybernetic avatars, you can enjoy sports together regardless of age or where you live.

Today a professional player from overseas participated incognito. Even with my physical handicap I can keep up with professional athletes using my cybernetic avatar!



SCENE 3 Have a full holiday

Climb a mountain early
in the morning with
your cybernetic avatar
and watch the sunrise.



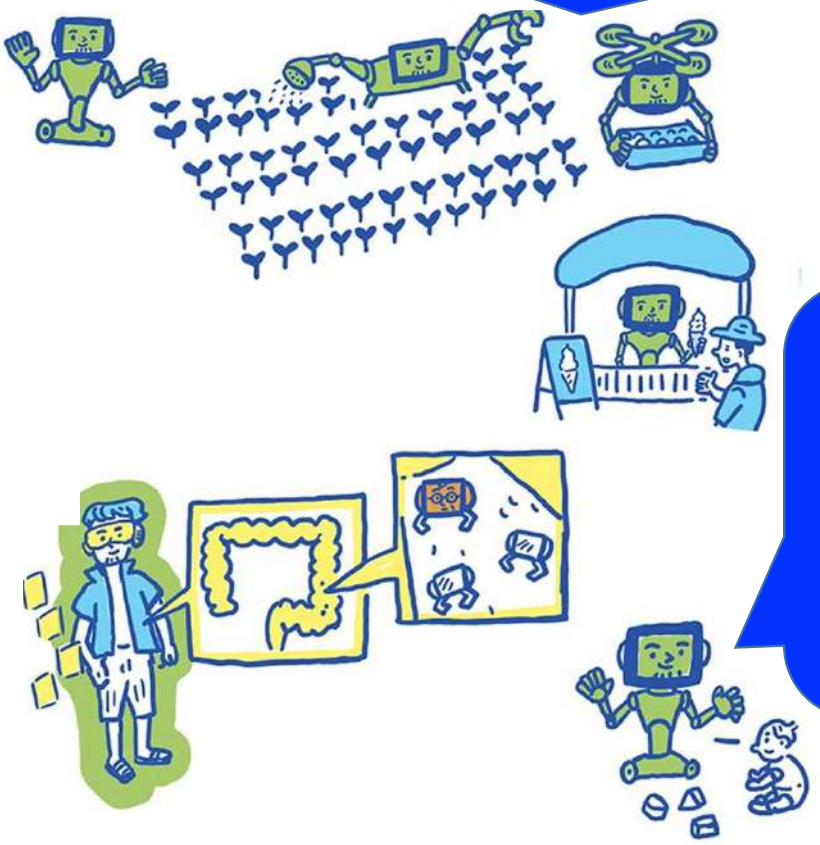
Then take lessons from a pianist in cyberspace.

Everything can be done while
relaxing on the beach,
refreshing your mind and body.

In the afternoon join the
live performance of your
favorite popstar!

SCENE 4 Health and longevity protected by Avatars

Thanks to cybernetic avatars, my farming can be done anywhere and the vegetable gelato shop I started last year is doing well.

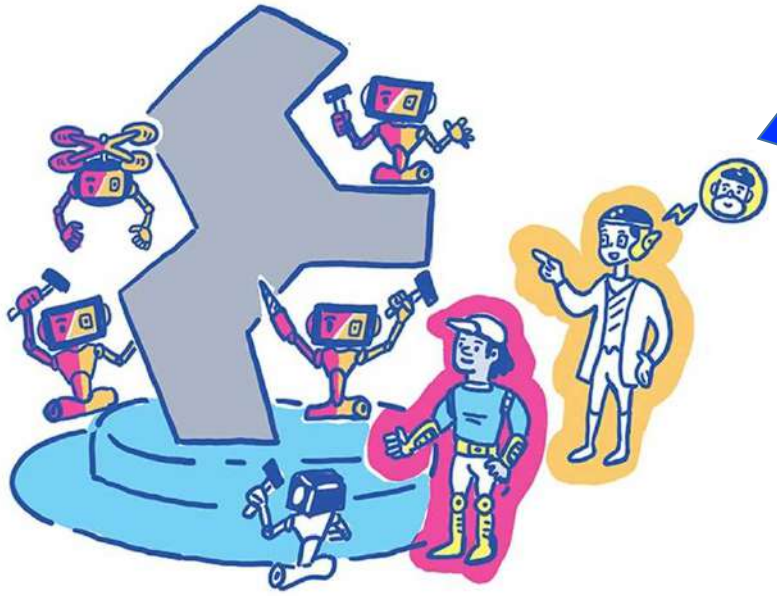


It is possible to prevent and treat diseases with nano avatars taken into the body. Healthy like expectancy is extended, and elderly people can continue to play an active role in society

My grandchildren live far away but I can see them anytime I want. Every day is fulfilling!

SCENE 5 Maximizing creativity

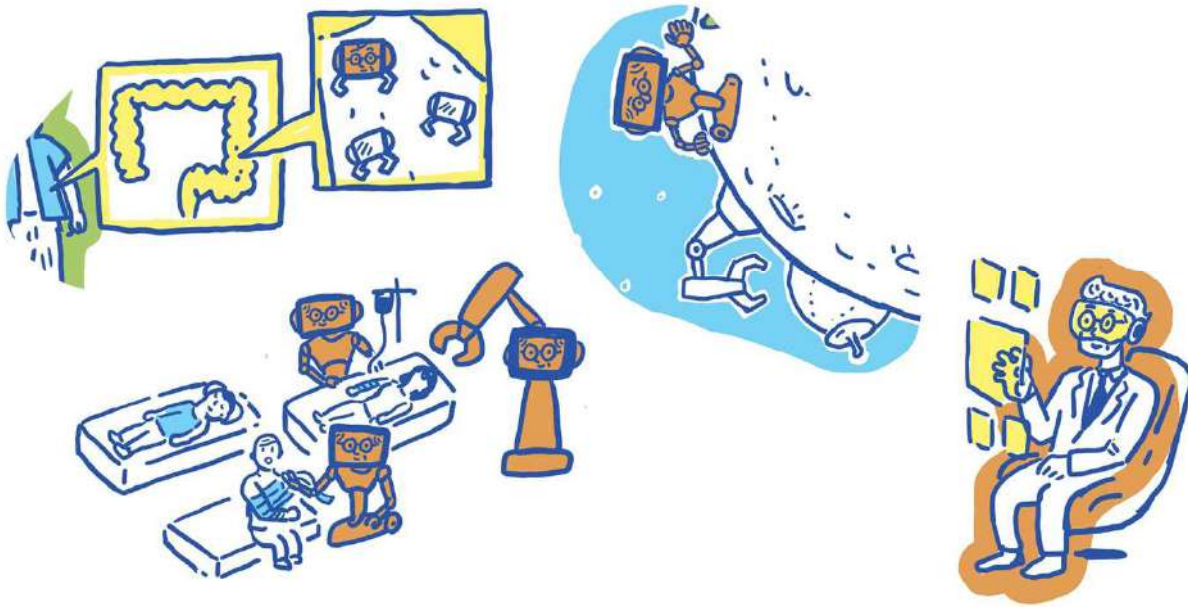
Even large-scale artworks can be created by one artist alone using a cybernetic avatar. Multiple users can also remotely operate multiple cybernetic avatars at the same time.



This artwork was made in collaboration with an architect.
By installing the craftmanship of the expert into your brain and then combining it with your own ideas, you can try new artistic expressions!

Go anywhere with "Cybernetic Avatars”

When operating "Cybernetic Avatars," users feel the same sensations as with their own bodies, therefore expanding the possible range of human activities.



We can work in diverse places, from outer space to inside the human body, and enjoy spontaneous travel by renting a local avatar while staying at home.

Large-scale complex tasks can be completed in a short time by one person remotely operating 10 or more robots as a principal conductor.

Moonshot Goal 1: Target 1

Target 1: Cybernetic avatar infrastructure for diversity and inclusion

- Development of technologies and infrastructure to carry out large-scale complex tasks combining large numbers of robots and avatars teleoperated by multiple persons by 2050.
- Development of technologies and infrastructure that allow one person to operate more than 10 avatars for one task at the same speed and accuracy as one avatar by 2030.

One teleoperator can remotely operate four robots at once (Osaka, 2008)

Complicated multitasks with Human-Robot Interaction

Cybernetic Avatars

Virtual reality with 3D video avatars in cyber-physical space

The ability to go back and forth seamlessly between cyber and physical space will allow us to enjoy new lifestyles.

These include new experiences such as watching concerts and sports through 3D video avatars.

The technology will help reduce the time and money spent on travel, and also minimize the risks associated with overcrowding.

Cybernetic Avatars

Augmenting body, cognition and perception for a fulfilling life

We will be free from the conventional limitations of our bodies and brains (cognition and perception) and have abundant means to achieve our dreams.

Cyborg (prosthetic body) technology expands the functionality of our bodies and brains, and will allow everyone to play active roles in their work and hobbies.

Physical capabilities that have diminished due to aging and illness will be augmented to promote more social activity, but artistic capability too will be augmented through aesthetic sense stored in cyberspace that is implanted into user' brains.

Moonshot Goal 1: Target 2

Target 2: Cybernetic avatar life

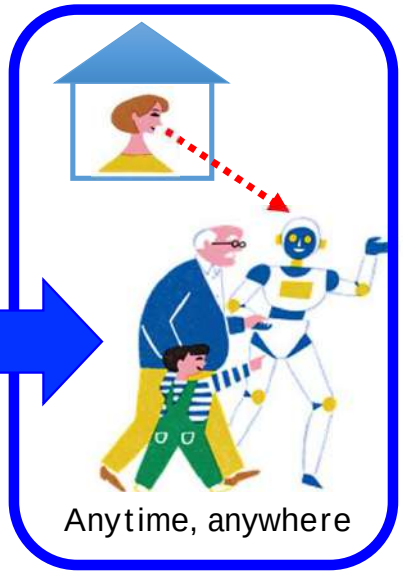
- Development of technologies that will allow anyone willing to augment their physical, cognitive, and perceptional capabilities to the top level, and spread of a new lifestyle that will be welcomed by society, by 2050.

- Development of technologies that will allow anyone willing to augment their physical, cognitive, and perceptional capabilities for specific tasks, and proposal of a new lifestyle that will be welcomed by society, by 2030.

Three types of target users in Cybernetic Avatars

Type 1 Users

Human-Avatar Interaction with hospitality

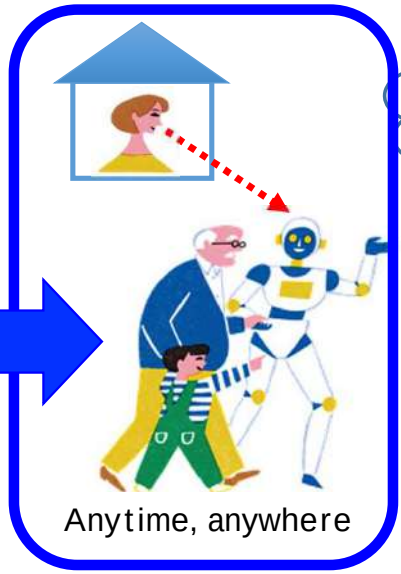


Three types of target users in Cybernetic Avatars

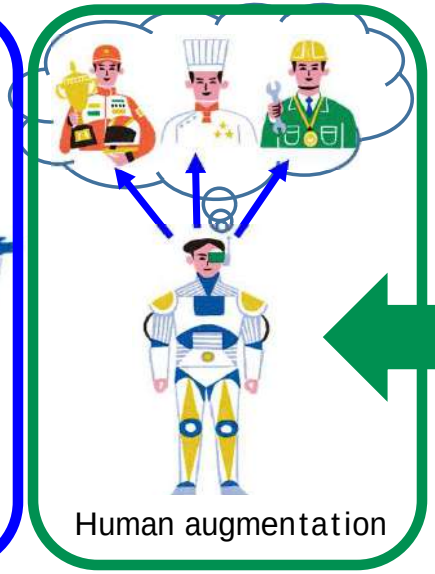
Everyone allows a variety of social participation

Type 1 Users

Human-Avatar Interaction with hospitality



Anytime, anywhere

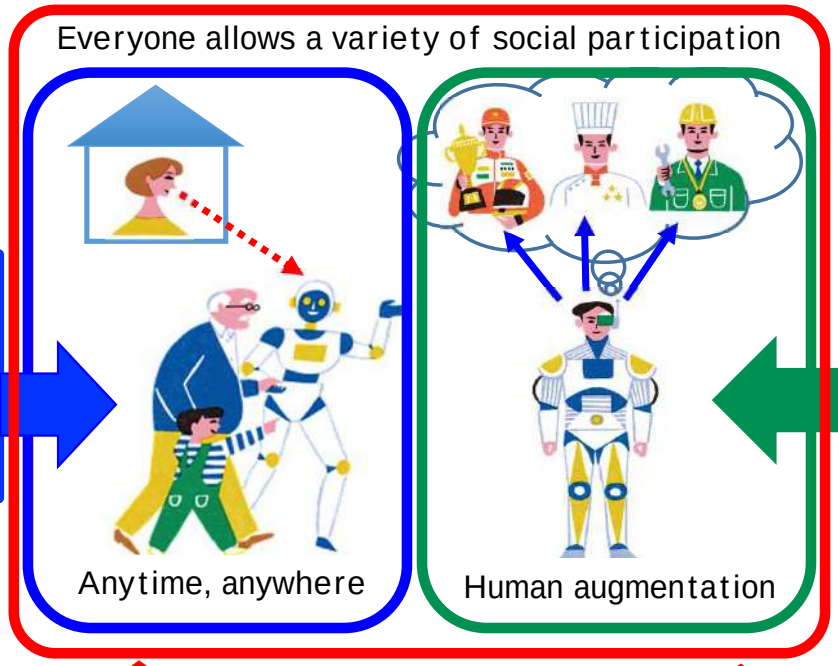


Human augmentation

Type 2 Users

Shared-Experience with wearable devices/systems

Three types of target users in Cybernetic Avatars



Type 1 Users

Human-Avatar Interaction with hospitality

Type 2 Users

Shared-Experience with wearable devices/systems

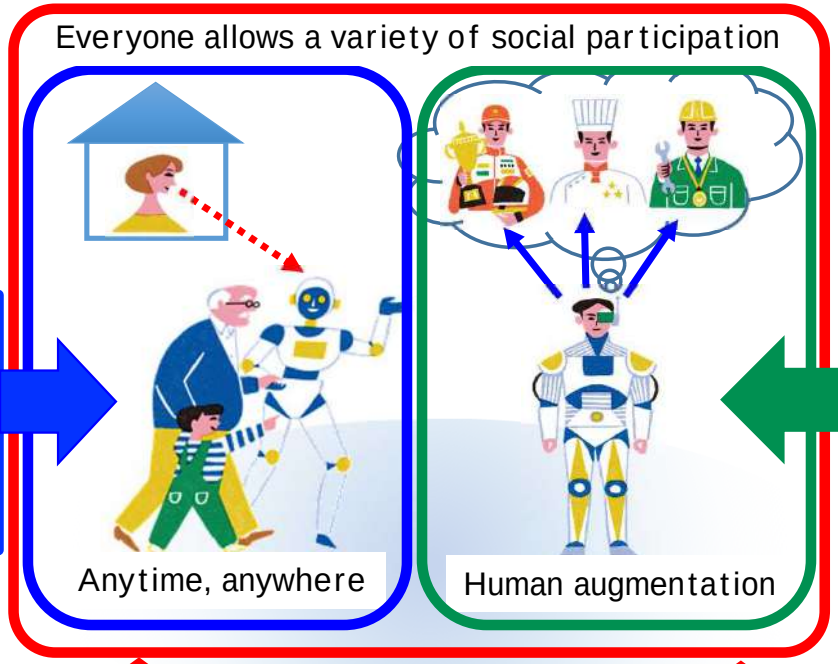
CA operation as we think in brain for “Thought in cloud”

Type 3 Users

Three Project Managers (PMs) for Moonshot Goal 1

Hiroshi ISHIGURO PM

Human-Avatar Interaction with hospitality



Kouta MINAMIZAWA PM

Shared-Experience with wearable devices/systems

Ryota KANAI PM

CA operation as we think in brain for “Thought in cloud”

R&D Project: ISHIGURO Hiroshi PM

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

Project Manager

ISHIGURO Hiroshi
Professor, Graduate School of Engineering Science,
Osaka University

Project Outline

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.

R&D Project: MINAMIZAWA Kouta PM

Cybernetic Avatar Technology and Social System Design for Harmonious Co-experience and Collective Ability

Project Manager

MINAMIZAWA Kouta
Professor, Graduate School of Media Design,
Keio University

Project Outline

This project aims to develop cybernetic avatar technologies that allow people to take full advantage of their abilities and share their variety of skills and experiences with many other people. Taking into account the social and ethical issues involved in the mutual utilization of physical skills and experiences, we will design a system that fits well with humans and society. By 2050 the inter-distribution of skills and experiences will allow people to link together and produce co-creations, and help realize a society in which everyone can freely engage in physical activities and challenges through cybernetic avatars.

R&D Project: KANAI Ryota PM

Liberation from Biological Limitations via Physical, Cognitive and Perceptual Augmentation

Project Manager

KANAI Ryota
Director,
Advanced Telecommunications Research Institute International (ATR)

Project Outline

This project aims to develop cybernetic avatars that can be controlled via intention. This intention will be estimated from brain activities and information observed on the surface of the human body and through interactions. We will integrate intention estimation methods using AI technologies, and enhance the functionality of cybernetic avatars controlled by brain machine interfaces (BMI) while considering ethical implications. By 2050, we will create the ultimate BMI-cybernetic avatars that can be freely operated by human intention.

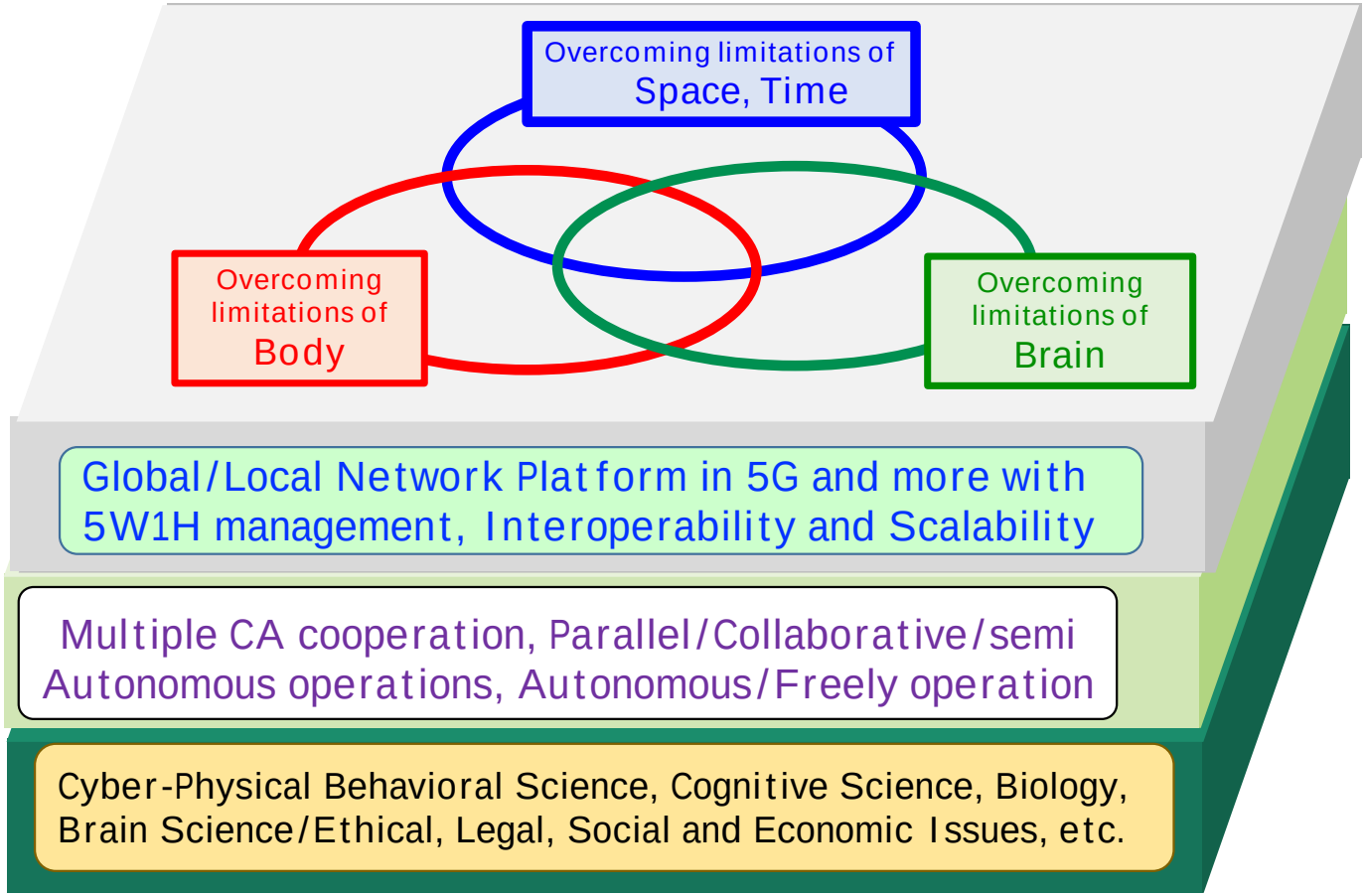
Four-layered R&D Management

Application Layer

Middleware Layer

Core-Technology Layer

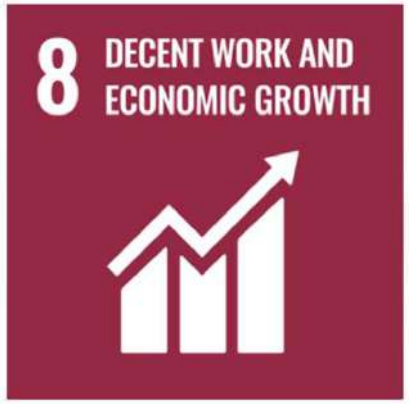
Basic Research/
ELSE Issues Layer



PD message to PM

- Human-centered R&D projects on the Cybernetic Avatars
- Cybernetic Avatars will be developed from the viewpoint of not only the providers but also the users in future society.
- The R&D projects should also do basic research on human stress caused by them and stress-relief methods while taking into account ethical, legal, social, and economic (ELSE) issues and information security.
- I hope they will help us adapt and adjust to a new human-centered 'Cybernetic Avatar Life'.

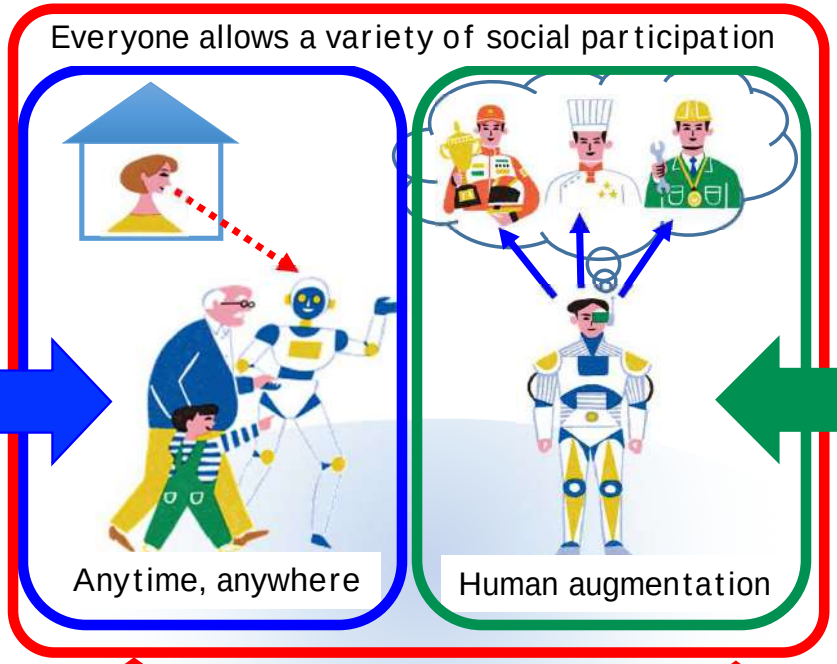
MS1 will contribute to mainly the following SDGs



Summary

Hiroshi ISHIGURO PM

Human-Avatar Interaction with hospitality



Kouta MINAMIZAWA PM

Shared-Experience with wearable devices/systems

Ryota KANAI PM

CA operation as we think in brain for “Thought in cloud”

Thank you for your kind attention