

Working Group 1

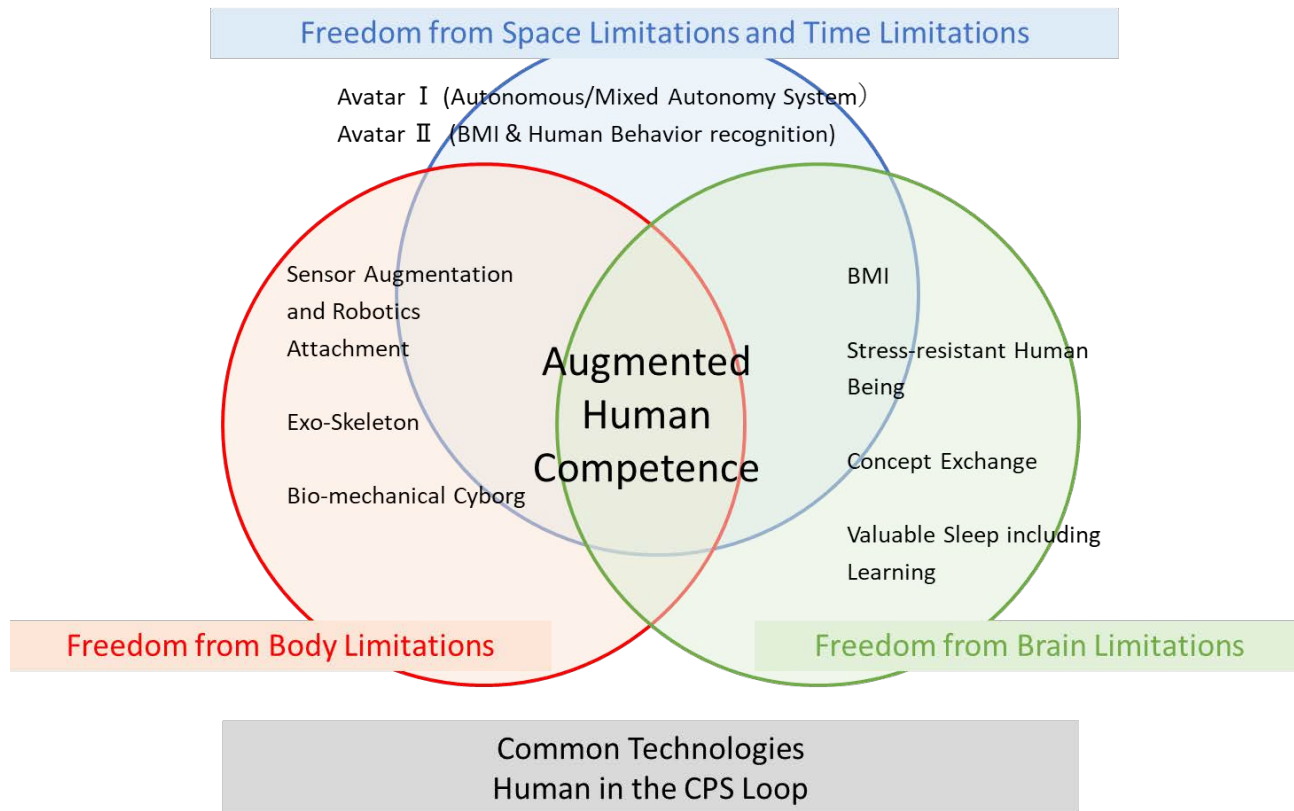
**Expanding human potential toward a society in
which everyone can pursue their dreams**

Sub-Theme

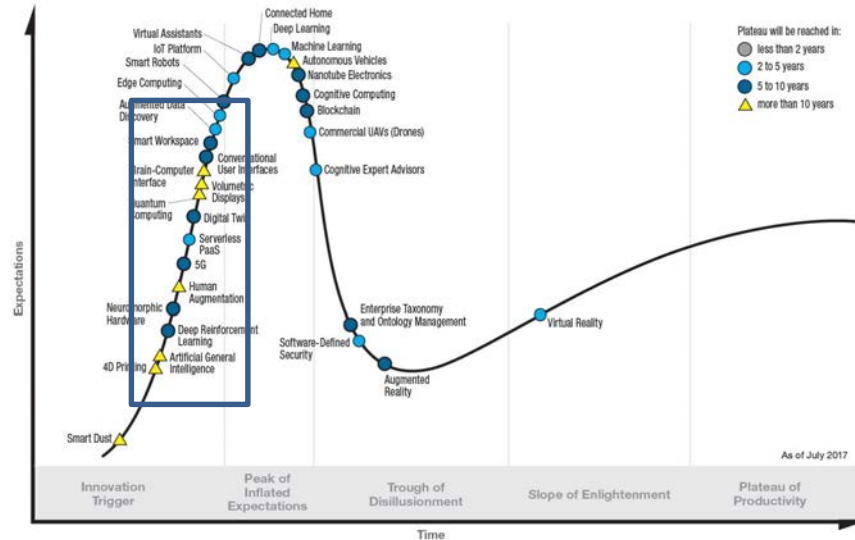
Freedom from body limitations

INAMI Masahiko
Professor, Research Center for Advanced Science and Technology,
The University of Tokyo

Positioning of this sub-theme in WG1



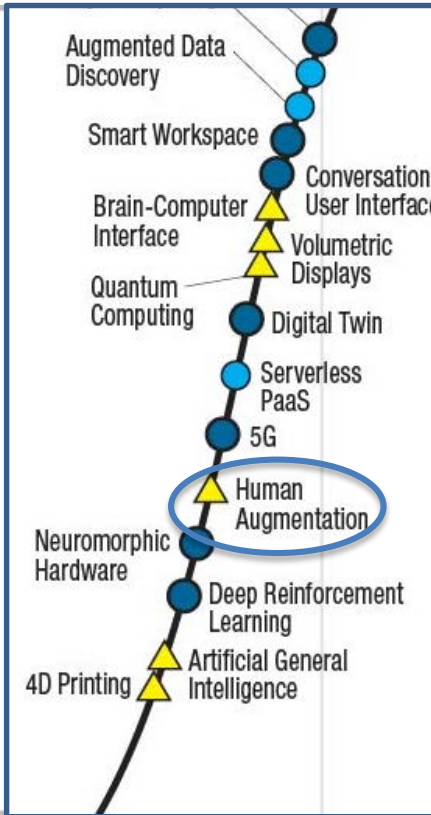
Gartner Hype Cycle for Emerging Technologies, 2017



gartner.com/SmarterWithGartner

Source: Gartner (July 2017)
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Gartner.



5 Trends Appear on the Gartner Hype Cycle for Emerging Technologies, 2019

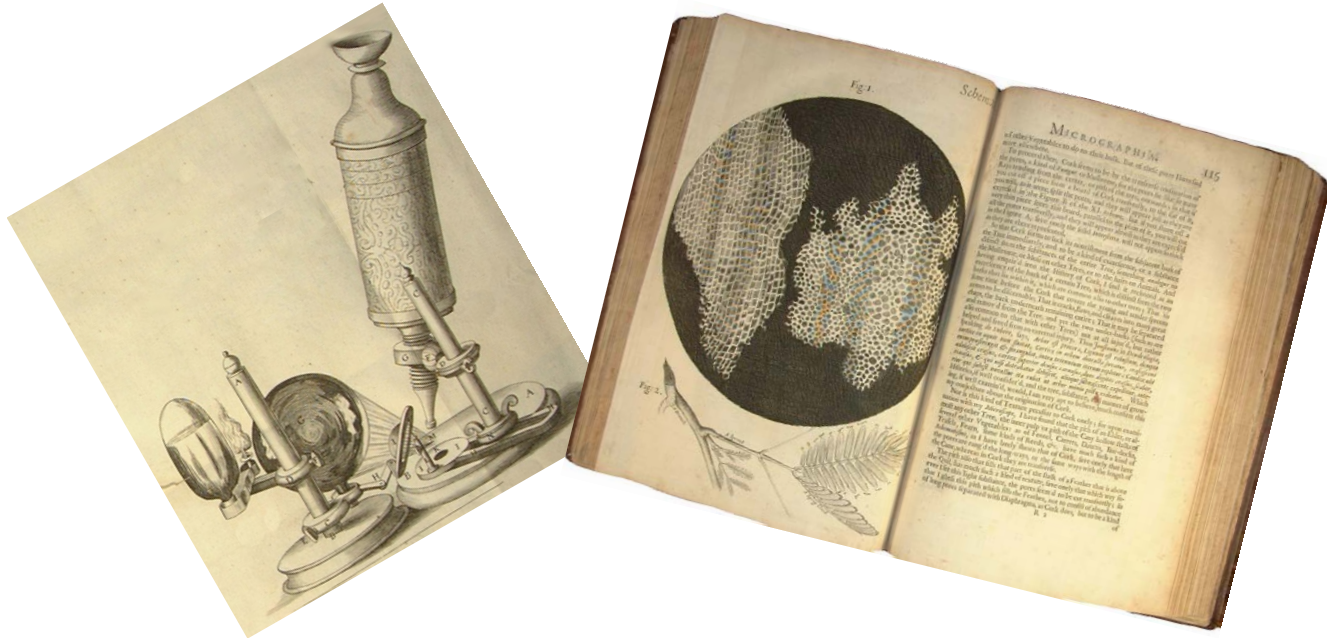
Augmented human

Augmented human technologies improve both the cognitive and physical parts of the human body by including technologies such as biochips and emotion AI. Some will provide “superhuman capabilities” — for example, a prosthetic arm that exceeds the strength of a human arm — while others will create robotic skin that is as sensitive to touch as human skin. These technologies will also eventually provide a more seamless experience that improves the health, intelligence and strength of humans.

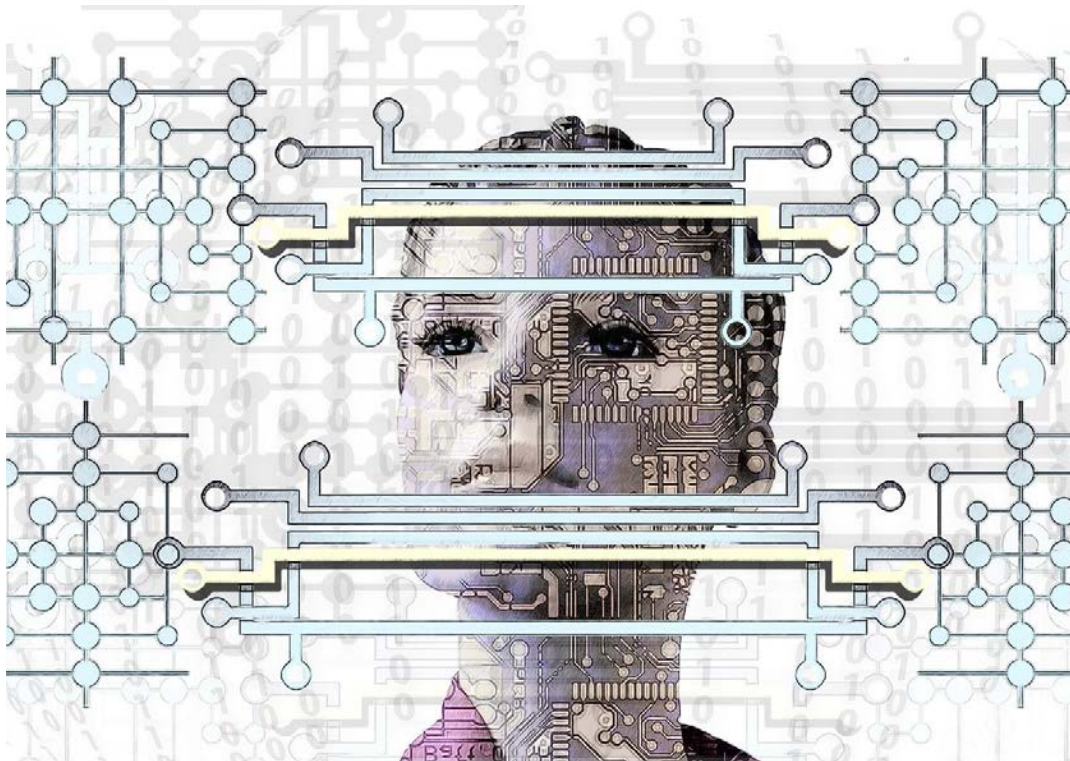
Other technologies in this trend include: Personification, augmented intelligence, immersive workspace and biotech (cultured or artificial tissue.)

Robert Hooke, Micrographia, 1665

“The first thing to be undertaken in this weighty work, is a watchfulness over the failings and an enlargement of the dominion, of the Senses.... The next care to be taken, in respect of the Senses, is a supplying of their infirmities with Instruments, and, as it were, the adding of artificial Organs to the natural.”



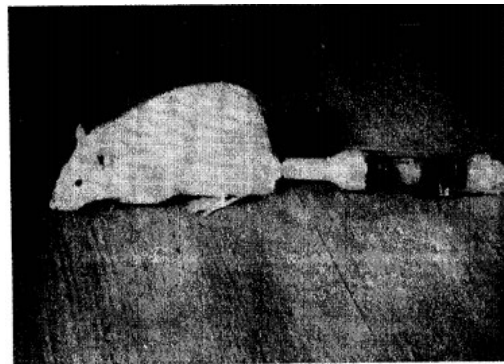
Cyborg



“Cyborgs and Space” (1960)

Manfred E. Clynes and Nathan S. Kline
(*Astronautics*, September 1960)

Altering man's bodily functions to meet the requirements of extraterrestrial environments would be more logical than providing an earthly environment for him in space... Artifact-organism systems which would extend man's unconscious, self-regulatory controls are one possibility.



One of the first Cyborgs, this 220-gm rat has under its skin the Rose osmotic pump (shown in close-up below), designed to permit continuous injections of chemicals at a slow, controlled rate into an organism without any attention on the part of the organism.

Human Augmentation Freedom from Body Limitations

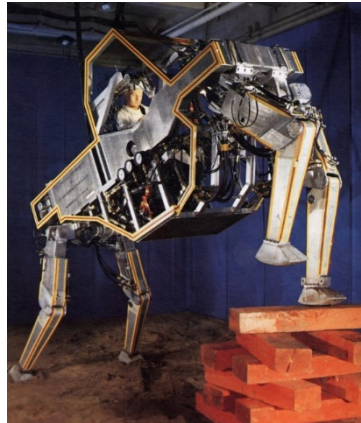
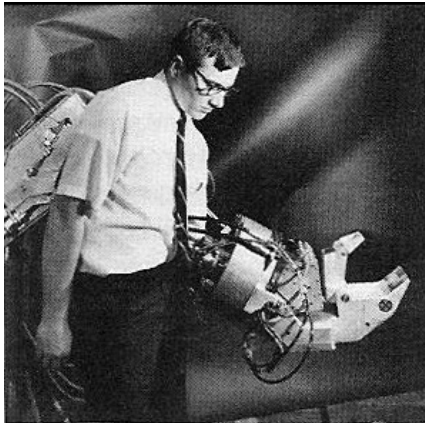
Starship Troopers (1959) Heinline

Cyborgs and Space (1960) Manfred E. Clynes
and Nathan S. Kline

Hardyman (1965) US Army/Navy

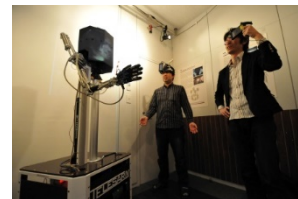
GE Walking Truck (1967) Mosher

Man-Amplifier (1967)



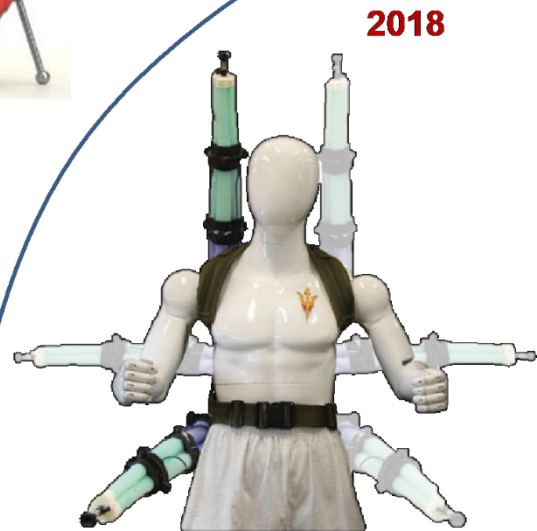
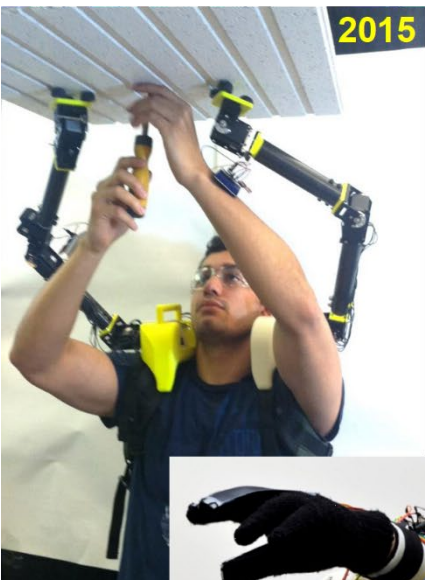
Telexistence(1980's-)

Dr. Susumu Tachi



Supernumerary Robotic Limbs

IROS2019 WS (Harry Asada)



Nguyen, et al, SoRo 2018

Human Augmentation



Perception



Body



Cognition



Presence

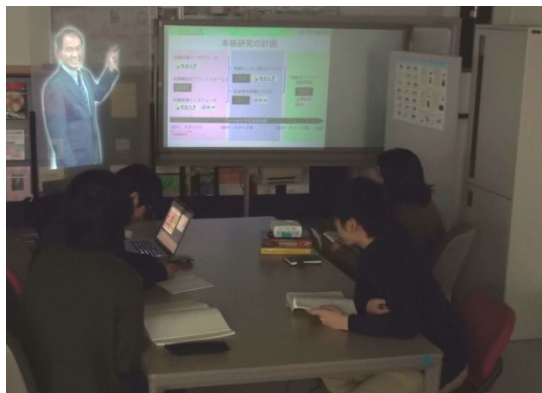
Digital Avatar



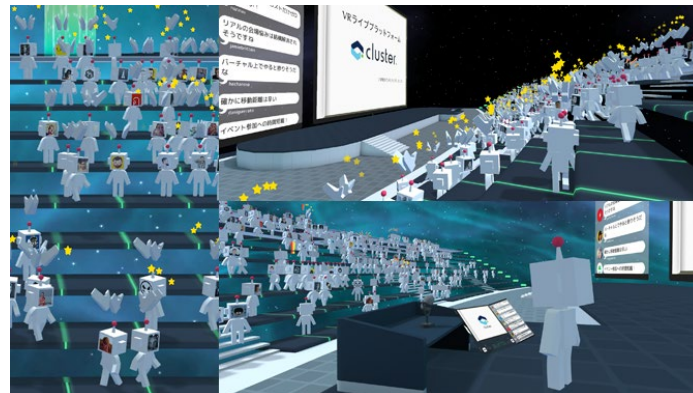
Telepresence Robot



Medical VR

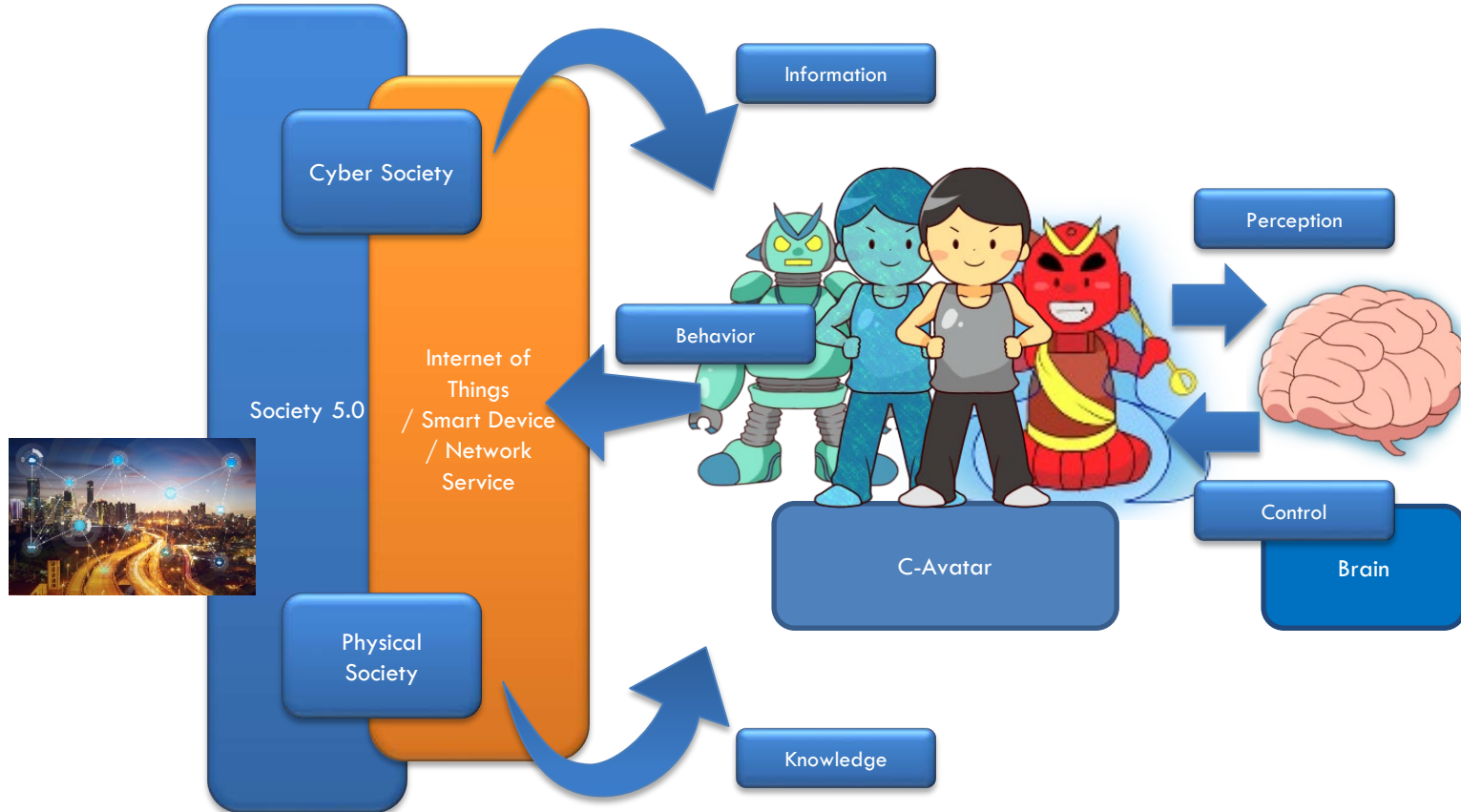


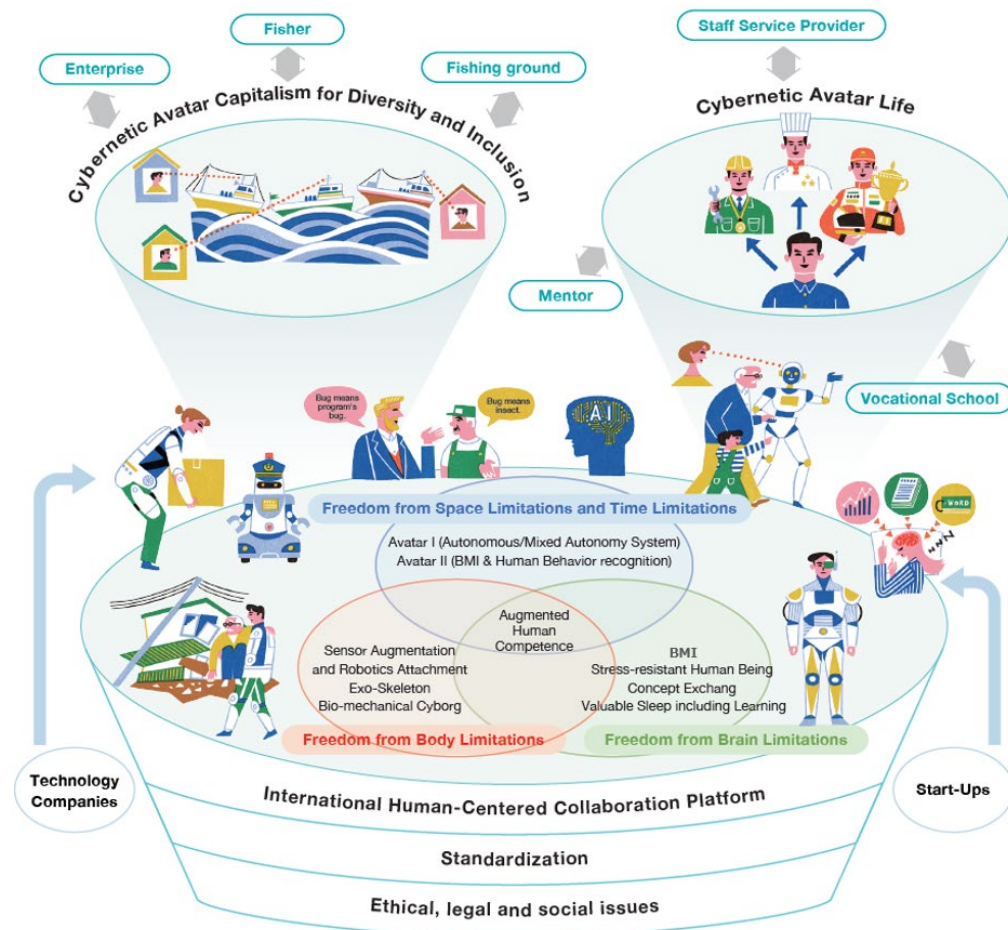
3D Avatar



Social Virtual Reality

Cybernetic Avatar (C-Avatar)







Presentation - Offering of Topics

Domenico Prattichizzo
Full Professor of Robotics,
Department of Information Engineering and Mathematics,
University of Siena

Discussion

Welcome

KITANO Hiroaki

**President & CEO, Sony Computer Science Laboratories, Inc.
/ Professor, Okinawa Institute of Science and Technology
Graduate University**

Overview of the 2 targets by WG1 (1)

**Cybernetic Avatar Capitalism
(C-Avatar)
for Diversity and Inclusion**

New type of social structure and economy

Anybody can provide their abilities
(expertise) anytime to/from anywhere
through C-Avatar



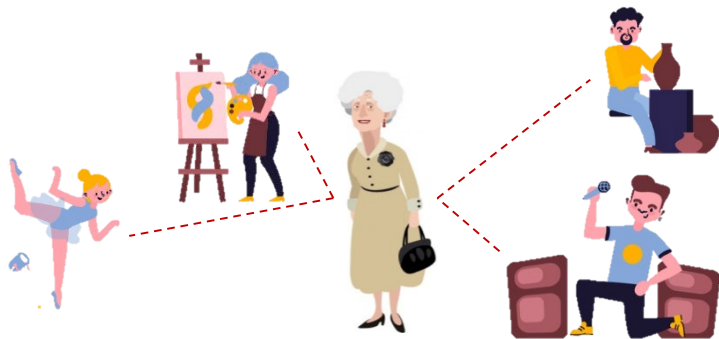
**Overcoming social divides and achieving diverse and inclusive society
by creating a new kind of social structure and economy**

Overview of the 2 targets by WG1(2)

Cybernetic Avatar Life

New type of myself (Another myself)

Anyone can improve their abilities through C-Avatar and can challenge to various kind of activities in Society 5.0 world.



Improving QoL by supporting creative, spontaneous activities such as recreational hobbies, travel, volunteering, art and entertainment, as well as everyday life at home

Conclusion

