

WG1: Expanding human potential toward a society in which everyone can pursue their dreams

We are in an era of declining birthrate and hyper-aging. There is an urgent need to create a society in which all people can participate beyond the limits of age, culture, physical ability, time, and distance.

We will discuss how innovative solutions and MS goal(s) can achieve a system that complements, expands and replaces human physical functions. These include robots/computers with living human bodies, brain-machine interfaces, feedback/feedforward of the five senses, and technology for real-time transmission of large amounts of information that will make these possible.

【Related examples of moonshot goals】

- Cyborg technology (by 2050)
- Full ubiquitous Mobility (by 2040)
- Holographic immortality via avatars for actions & experiences (by 2040)
- Medical treatment everywhere and for everyone (by 2040)

WG2: Realizing a human life that “continues to improve both physically and psychologically” through complete understanding of biological functions such as the nervous system and related tissues

There is still much we do not know about the relationship between the brain and the neural network of our entire peripheral nervous system and related tissues, including the immune systems of our intestinal tract tissue and lymphatic vessels.

We will discuss how frontier research areas and MS goal(s) can help us understand life phenomena and maintain human health physically and psychologically. Issues will include research on the nervous system and related tissues to elucidate mechanisms of life such as metabolism, immunity, and sleep.

【Related examples of moonshot goals】

- Creation of digital models of entire nerve system and relevant mechanisms (by 2050)
- Dramatic improvement of QOL among the elderly (by 2035)
- Preventive measures for human wellness (by 2040)
- Establishment of digital model and manipulation technology in biology (by 2050)
- Human hibernation (by 2050)

WG3: Expanding frontiers through co-evolution of AI and robots

To overcome the limitations of Deep Learning, such as difficulty responding to unknown events and the escalating costs and efforts required for machine learning, we must make AI learn and grow by itself to reduce the power consumption of devices and help discover optimal architectures. It is also important to expand frontiers through AI-robots and fusion research. This kind of research aims to help build AI that can autonomously structure knowledge and learn through embodiment in robots, feedback in robots-environment interaction, which will give us more fields so that robots can overcome current difficulties.

We will discuss how innovative solutions and MS goal(s) can realize robots that are autonomously directed and controlled by AI, as well as contribute to activity frontiers such as outer space, crewless construction, disaster sites, etc.

【Related examples of moonshot goals】

- Full automation of agriculture, forestry & fisheries (by 2040)
- Full automation of construction work (by 2040)
- AI/robotic system toward autonomous discoveries of Nobel Prize-level R&D (by 2050)
- Synchronized satellite constellation and space robotics (by 2035)

WG4: Sustainable resources circulation for global environment

To recover the global environment, it is essential to realize sustainable resources and materials circulation.

We will discuss innovative solutions and MS goal(s) to realize sustainable resources and materials circulation for greenhouse gas reduction and global environmental remediation. These include greenhouse gas reduction technologies by resources and materials circulation, such as carbon recycling, resource-saving technologies, environmental-remediation technologies, and the energy-saving and renewable-energy technologies required for them.

【Related examples of moonshot goals】

- Full recycle system for resources and materials (by 2050)
- Reduction of resources losses to 1/100th (by 2050)
- Reduction of energy consumption per calculated unit to 1/1000th (by 2040)
- 100% self-sufficiency with sustainable energy (by 2060)
- Elimination of garbage on the earth (by 2050)

WG5: Innovation for future agriculture –satisfying both food production and environmental conservation

Food demand will certainly increase due to expanding global population. On the other hand, our environment for food production is deteriorating due to climate change, such as global warming, desertification, and depletion of natural resources. Therefore, the enhancement of agricultural production is a major global issue for our future.

We will discuss innovative solutions and MS goal(s) to satisfy both increase of agricultural production and environmental conservation on a global scale by integrating cutting-edge technologies such as AI, robotics, and biotechnology with use of natural organisms like soil microbes. These solutions also contribute to optimizing the entire process of food value-chain from breeding through agricultural production, distribution, to consumption.

【Related examples of moonshot goals】

- Full automation of agriculture, forestry & fisheries (by 2040)
- Elimination of food loss (by 2050)
- Harmonization between agriculture and biodiversity (by 2050)

WG6: Creating innovative non-traditional sciences and technologies based on quantum and related phenomena

Since quantum technology is set to have dramatic impacts on our economies, industries, and security, it is crucially important to promote quantum technology strategically from a long-term perspective.

We will discuss the quantum technologies necessary to realize network of quantum computers and MS goal(s). These include quantum sciences and technologies such as quantum memory, general-purpose quantum computers, quantum relay technologies, quantum networks, etc.

【Related example of moonshot goal】

- Quantum computer network for general use (by 2050)

WG7:Cross sectional issue

We will discuss cross-disciplinary concepts and methods related to all MS goals. In particular, efforts to develop mathematical models to formulate social problems and importance of addressing Ethical, Legal and Social Issues of innovative research will be discussed.