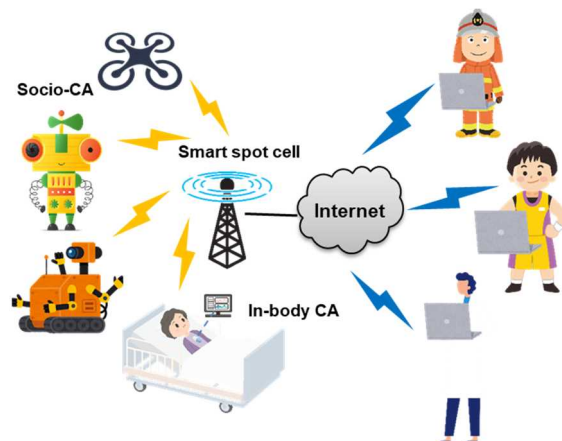


## Reliability-ensuring Cybernetic Avatar Infrastructure Allowing Interactive Teleoperation

### 1. Position in the program

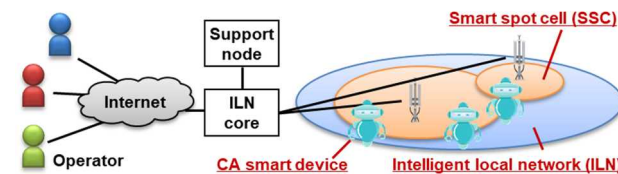
This project aims to develop a highly reliable communication platform that supports the realization of socio-CA and in-body CA enabling human beings to be free from limitations of body, brain, space, and time. By clarifying the technical and institutional issues common to different CAs, we develop a reliability-ensuring CA infrastructure that allows interactive teleoperation between human beings and CAs even in an unstable network with large delay and jitter and/or unexpected momentary disconnection and supports the human-CA coexistence society in 2050.

In addition, we will promote standardization activities for domestic and international communication technologies with solving problems such as the institutionalization of Local 5G. Also, in collaboration with other projects, we will promote activities that contribute to the standardization of cyber-physical systems-based technologies and the resolution of institutional issues.



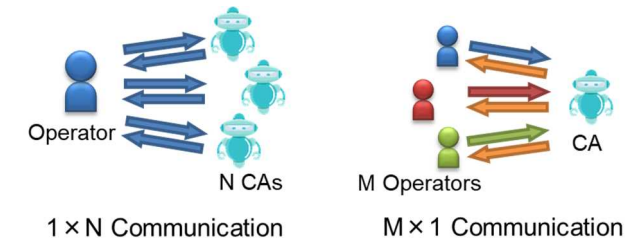
### 2. Overview of the R&D and the Challenges

This research and development project aims to develop a highly reliable communication platform that supports the human-CA coexistence society in 2050, as set out in Moonshot Goal 1. To achieve this target, we are carrying out three research and development themes: (1) Development of Smart Spot Cell (SSC) that provides an appropriate wireless communication environment for CAs, (2) Optimal configuration of end-to-end (E2E) network connecting operators and CAs, and (3) Development of platform with jitter reduction and low latency.



In CA remote control, problems in the communication path induce various problems such as jitter and disconnection, causing unstable CA operation, feedback delay to CA operators, etc. Accordingly, it becomes difficult to maintain stable CA operation and interaction between operator and CA users. To solve these problems, we are developing (1) wireless management technology that stabilizes the wireless environment surrounding CAs with flexible control of radio parameters, (2) network optimization and are management technologies that ensure communication speed and delay even in an environment where many CAs are operating in a wide area, and (3) reliability-ensuring platform that provides highly reliable E2E path considering best effort networks such as the Internet. With the application of this platform to  $1 \times N$  communication, in

which one person operates multiple (N) CAs while switching between them, and  $M \times 1$  communication, in which multiple (M) operators cooperatively operate one CA while sharing their skills, we have begun investigation of the architecture and performance evaluation using computer simulations and are proceeding with studies toward the development of practical technologies.



### 3. Future plans

We will develop an evaluation environment for reliability-ensuring infrastructure and comprehensively proceed with verifications of not only communication performance but also smooth operation of CA and the user experience of interacting with CA in cooperation with each project of socio-CA and in-body CA of Moonshot Goal 1. In addition, we will identify issues in the future coexistence society of human beings and CAs, deepen discussions on the ideal reliability-ensuring infrastructure, and aim for early development and social deployment of basic technologies that sustain interactive communication between operators and CAs and between operators and users who interact with CAs.