In cooperation with the Embassy of Japan in Germany, the Japanese-German Center Berlin will hold a symposium on the topic "Future Communication Technologies: Beyond 5G and 6G – Opportunities for Japanese-German Collaboration"on 17 February 2022. Below is an interview with the keynote speaker at the symposium Mr. Tokuda Hideyuki, President of the National Institute of Information and Communications Technology (NICT).


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Can you please explain briefly what research is being conducted into next-generation ICT and how this technology is progressing?
With a view to being able to respond flexibly to global social issues such as natural disasters, global warming, pandemics, and adapt to the "new normal" society in the post-corona era, as well as transform Japan into a sustainable and resilient society, we aim to accelerate digital transformation (DX) and implement a human-centered Society 5.0 through the fusion of the physical and cyberspace.
In line with the 5th mid-to-long term plan that began in April 2021 and aiming at early implementation, we are strongly promoting the acceleration of R&D and open innovation in five priority areas (advanced electromagnetic wave technology, innovative networks, cybersecurity, universal communication, frontier science) and in four strategic research areas: Beyond 5G, AI, quantum ICT and cybersecurity.
We are also accelerating the social evolution of R&D results through the improvement of testbed environments aimed at open utilization of data from research and the activities of corporations that employ advanced technologies developed by NICT.

The corona crisis has accelerated digital transformation. What innovative technologies are Japan and Germany planning and how long before they are launched? Please tell us about any new technology that has already been put into practical use.
NICT is actively applying cutting-edge ICT as new coronavirus countermeasures. For example, we are using the high-output DUV-LED technology under development to build a light-sterilization system that is clean, portable, and can instantly inactivate a wide range of viruses. In hospitals, we are aiding the autonomous operation of robots through highly secure HD video and UWB technology, allowing ER/ICU specialists to help seriously ill patients remotely.
NICT's thin client type VPN telework system, based on a comprehensive testbed, is aiding SMEs and organizations in urgently setting up work-at-home environments.
Multilingual translation technology is being used to improve translation efficiency in clinical trials and drug approval application procedures in the pharmaceutical and medical fields. We are also testing the practical application of dialogue technology to prevent decline in the health and cognitive function of elderly people living alone. In the future (around 2030), we expect remote work and customer service to be easy and secure using cybernetic avatars (alter-ego robots) by employing neural communication engineering and BMI technology. We believe various fields of industry will benefit from solutions to the distancing restrictions caused by the corona crisis.

What does the introduction of core technologies and innovations, including the 6G standard, mean in terms of achieving sustainability and climate policy goals? Also, how is the resilience of the communications network infrastructure, and the protection of personal information protection in it, safeguarded?
B5G/6G is expected to be more than ten times as fast as 5G, have ultra-low latency, and be capable of ten times as many simultaneous connections. Two aspects speak to sustainability and counteracting global warming: the greening of industry by ICT and the greening of ICT itself. B5G and 6G is hotly anticipated in these two respects, because it will also allow ultra-low power consumption, ultra-security and reliability, autonomy, scalability, and other features, thus contributing to the greening of all industries. Moreover, green ICT will contribute significantly through technology for ultra-low power consumption and photoelectric fusion.
It is hoped that, with B5G/6G, a communication environment for drones, ships, aircraft, etc. can be provided – both in normal times and in times of natural disaster – based on the seamless coordination of satellite communication systems through both terrestrial mobile communications and non-terrestrial networks.
As far as protecting personal information goes, secure computing technology using homomorphic encryption alone is insufficient, and it is essential to establish legal regulations such as the Amended Personal Information Protection Act in Japan and the EU's General Data Protection Regulation.

Please tell us about existing R&D cooperation between Japan and Germany in the field of ICT. In which fields do you think the two countries should cooperate in the future?
We have the Hannover Declaration of March 2017, and a community of ICT researchers has been established. At NICT, the Flexible Factory Project (FFPJ) for realizing smart factories that use Industry 4.0 and IoT technology was implemented based on the 2017 MoU between DFKI and NICT, and social implementation and international standardization activities based on public-private partnerships put into practice.
Also important is the acceleration of Japan/EU R&D collaboration in the coordination of HAPS/satellite non-terrestrial and terrestrial systems for the implementation of an air-space-ground communications infrastructure made possible by next generation B5G/6G.
AI (multilingual speech translation, simultaneous interpretation, interactive technology, neural communications), cybersecurity, cybernetic avatars, XR/MR, etc. are also pivotal fields. Moreover, R&D into bilateral quantum cryptography networks is a key issue since it is closely related to the security of countries sharing the same value system. I also believe that R&D and proof-of-concept for quantum internet will be crucial in the long term.