

## Communication Support to Deepen Human Connections Leading to a Spiritually Enriched Society through Information Technology

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### Abstract

While information technology enriches our lives, those of us who use it are also required to develop literacy in it and understand its pros and cons. For example, artificial intelligence (AI) is advancing day by day, and AI-human communication is even becoming easier, but we must be careful because this could also lead to a decline in human-to-human communication. NTT Distinguished Researcher Naomi Yamashita is working to deepen communication using information technology. For this issue, we spoke to her about her research into solving the various problems facing modern society and the mindset required of researchers.

*Keywords: information technology, human-computer interaction, human connection*



### Using information technology to support people and create a positive cycle of human connection

*—First of all, what exactly is “research on communication support to deepen human connections”?*

In the “research on communication support to deepen human connections” project, we aim to use information technology to create opportunities for human-to-human communication and thereby resolve social issues. In the modern age, where information technology is widespread, we can easily communicate with people in remote locations, but at the same time, problems such as social fragmentation and isolation are becoming more apparent. For exam-

ple, in recent years, we often hear people say that “it’s easier to talk to artificial intelligence (AI) than to other people, and it makes life less stressful.” However, I am concerned that if AI continues to evolve in this way, people will become truly isolated. It’s true that human communication often leads to misunderstandings and conflict. But there are also concerns such as the potential to just brush off what you find annoying, or dying under the watchful eye of AI. “Society 5.0” sets out an ideal form of our future society. Its aim is for AI to become a presence that connects people well, rather than replacing people. It considers the direction of future AI evolution and methods for implementing it in society.

This research belongs to the field of human-computer

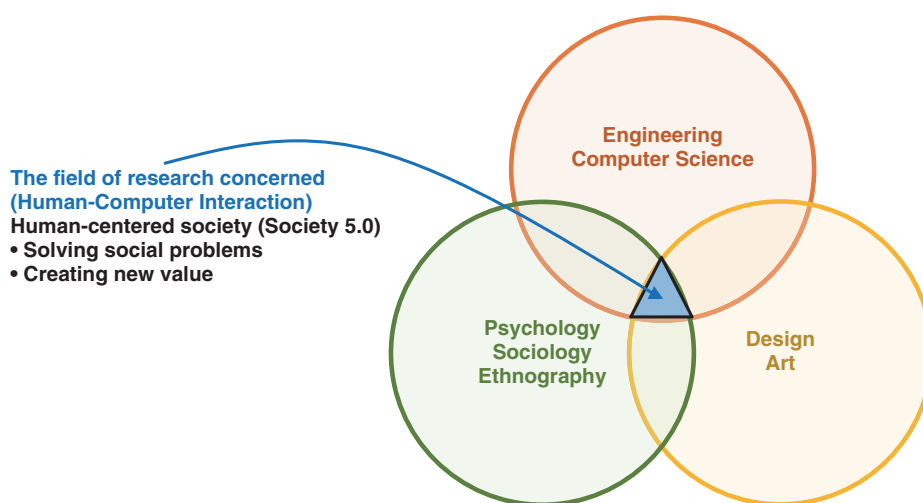


Fig. 1. Overview of the field of human-computer interaction.

interaction (**Fig. 1**). This field is a multidisciplinary domain that studies the relationship between people and various information technologies, including computers, and is characterized by the fact that many research fields overlap. For example, by combining perspectives, methods, and knowledge from computer science, cognitive science, psychology, sociology, as well as art and ethnography, we seek information technology that can be used to create new value to realize a more livable and prosperous society by taking a multifaceted approach to social issues.

One example of the work I have been involved in is research into supporting the social reintegration of people with depression. The reason I started this research was because I thought that as a specialist in designing information technology that connects people, I should return to the question of “what should be done?” and take on challenges that will contribute to solving social problems. I had heard about many of the social issues that the spread of information technology was causing when I went to give lectures. For example, mothers who are holding their babies used to make eye contact with their babies and talk to them, but nowadays, some mothers are so distracted by their smartphones that they are unable to make enough eye contact with their babies. In response to this, there have been concerns raised in fields such as cultural anthropology, and there have been cases where young animals who were not raised by their parents in zoos have grown up to neglect their own children in the same way. There is a fear that this could happen to humans too, as it becomes harder and

harder to raise children in successive generations. My thinking on this issue is that if the negative cycle is really caused by the spread of information technology, then there is the potential to use information technology to create a positive cycle.

When I actually thought about it and considered it from my own surroundings, the one community that came to mind was people with depression. For example, when someone with depression takes some time off work and then returns to work, I often hear stories of how people don’t know how to interact with them and end up treating them with excessive caution, and after a while the depression comes back. Of course, there are treatments for people with depression, but I had a couple of thoughts. One, if the environment around the patient doesn’t change, the same thing will happen over and over again. Two, if you are going to intervene, you need to include not only the patient themselves, but also the people around them who are taking in the patient, otherwise the problem won’t be solved. And it is information science, not medicine, that can step in such situations. The project was launched, and the app “Mimamo Mate” (**Fig. 2**), which was developed based on a series of studies, was used by a non-profit organization that assists with mental health.

*—What difficulties did you encounter in your research?*

I originally started my research in mathematical engineering when I was at university, so I thought I

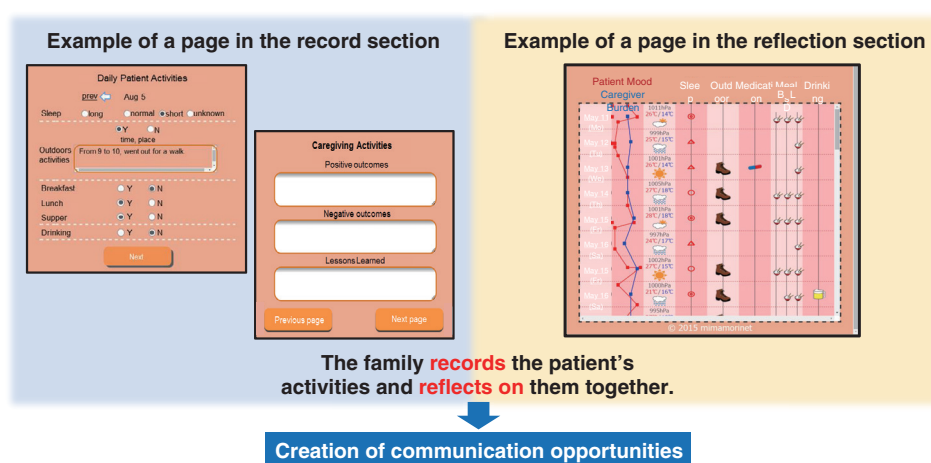


Fig. 2. Screen of the “Mimamo Mate” app.

would use mathematics as my weapon. However, I gradually began to feel that looking at data based on numbers alone had its limitations. So I changed my research direction and worked on joint research with many people to learn research and analysis methods based on the ideas of fields such as sociology and psychology. I thought that the advice and comments of experts in the medical field would be particularly important in advancing this research, so I actually asked them to join the project and work with us on the research.

More specifically, while previous research on depression support had focused on making treatment for patients more effective and efficient, this research focused on communication between patients with depression and their families, and we worked on building a system that would create opportunities for communication between them. The reason for this is that while it has been demonstrated that patients with depression are easily affected by their family environment, and that patients with cooperative family caregivers recover more quickly, there are almost no studies that focus on family caregivers or improving the family environment. Therefore, we thought that improving the family environment through family caregivers would improve the symptoms of patients with depression.

However, at the beginning of the project, we encountered many unexpected obstacles. For example, the initial approach involved conducting research by approaching the families of patients through our collaborating psychiatrist, but such research needed to be approved by the ethics committee of the medical

school, and this took more than half a year. Furthermore, although we were finally able to approach family caregivers via doctors, since we had reached the family with the patient's permission through the doctor's referral, of course the family could not say anything if they were dissatisfied with the doctor or patient, so it was quite difficult to find out their worries and true feelings. Ultimately, we were able to create a situation where we could investigate what people really think quite freely by directly recruiting and interviewing family members without going through doctors and patients. As you can see, even just changing the method of recruitment can completely change what you can find out, and each process up to the point of producing research results was a continuous struggle, but we were able to reach the final development stage after receiving a lot of feedback.

—What other research are you involved in?

In addition to supporting people with depression, I have also been involved in research to solve current social problems by using information technology to support communication and collaboration. We have designed a number of systems based on user analysis to meet the needs of various stakeholders for a wide range of social issues, including supporting the participation of non-native speakers in communication between multinational members and supporting meetings and interactions for LGBT people. For example, we used a device (Fig. 3) that measures stress levels by attaching a sensor to the arm to help



Fig. 3. Example of design based on social problems.

postpartum women deal with postpartum depression. More specifically, by using an app that shares the mother's stress levels (collected by sensors) with the father, we have succeeded in creating opportunities for communication between husband and wife.

### The fine points of one's own emotions are where the clues to research are hidden

#### —What are your future research prospects?

While many of the studies I have worked on so far have been short-term, solving many of the social issues that society is facing, such as a declining birth-rate and aging population, environmental issues, and the prevention of lifestyle diseases, requires mindset and behavioral change from a long-term perspective. Moving forward, we will scale up our research even

further and look towards research from a longer-term perspective. There is pressure on young researchers to keep producing results, so there is a risk involved in taking on a challenge that will take time to produce results, but I think that the research challenges I should be tackling now are precisely those that are considered difficult.

Looking further ahead, NTT's vision for IOWN (Innovative Optical and Wireless Network) is to value diversity and improve understanding between people with different values, as well as the quality of the "connections" between people and society, and I believe that this is in line with the direction of my research. As mentioned above, the rapid development of AI is raising expectations for improved convenience and risk avoidance through future predictions, but the way AI is used and its impact on users are also very important research topics. Moving forward, we will continue to strive to realize a more prosperous future society while exploring ways to provide these technologies.

In particular, the social issues we will be tackling are complex, and it is not feasible to solve them with a single field or technology. By combining diverse perspectives and knowledge with the help of as many people as possible, we hope to create deeper insights and practical solutions, and together achieve a sustainable and prosperous society.



*—Finally, do you have a message for researchers, students, and business partners?*

At NTT Communication Science Laboratories, where I work, we research information technology, people, and the connection between people and information technology, and the freedom to choose research topics is very appealing. At the same time, I think that some young researchers may be experiencing difficulty with having to do their best with their daily workload, and then also having to carry out research and produce results on top of that. In such cases, I think it is important to stop and reflect on what is being asked of you, and to have the courage to be prepared to let go of something. This does not mean that you should abandon things irresponsibly. I think that you can achieve your aim by suggesting something is unnecessary or asking for help from other people.

I also think it is important to pursue your own strong points and passions. The key to expressing your commitment and strengths is often to be found near-at-hand. The fine points of emotions that arise in everyday life are the things that reveal a person's values. For example, if you get angry, by asking yourself why you're angry, you can become aware of your hidden values, such as how you think something should be. And if you think about things from a big-picture perspective, asking yourself questions like "Is that really how it should be?" and "Will that really

make for a better society?" I think you will be able to see the path you should take. I think it would have been tough for me to do that when I was younger, but I hope that this will be of some help to young researchers who are struggling to find their way in research.

#### ■ Interviewee profile

In 2001, Naomi Yamashita completed a master's program in applied mathematics and physics at the Graduate School of Informatics, Kyoto University. In the same year, she joined Nippon Telegraph and Telephone Corporation. In 2006, she completed a doctoral program in social informatics at the Graduate School of Informatics, Kyoto University and obtained Doctor in Informatics. She is engaged in research on information technology to solve problems facing society (such as language and cultural friction issues associated with advancing globalization as well as mental health issues). In 2024, she was named a fellow of the Information Processing Society of Japan (IPSJ), in 2020 she received the KDDI Foundation Award, in 2016 she received the IPSJ Yamashita SIG Research Award, and in 2011 she received the IPSJ Nagao Special Researcher Award.