Establishing Practices that Help People Take Ownership of Societal Challenges

AR & MR Contents to Deep Dive into Societal Issues

Workshop in progress using an MR device

Overcoming the increasingly complex challenges facing modern society, such as climate change and food supply, is no easy task. If we are to create a sustainable future, what is needed when addressing these challenges is for everyone living on Earth to look past their individual perspectives, taking on a sense of ownership of the problem and sharing a common understanding of the issues. In 2021, the Hitachi Kyoto University Laboratory developed an educational resource entitled, "AR & MR Contents to Deep Dive into Societal Issues" that incorporates the views of the coming generation of young people. Developed in partnership with Kyoto University students, the resource encourages people from different generations to feel a sense of ownership of the problem, using realistic AR and MR experiences to get them thinking about societal challenges. Here *Hitachi Review* speaks to three key people involved in the project about how it got started, the concepts and features it embodies, and what they have in mind for the future.

Giving People a Sense of Ownership of Societal Challenges of 2050

The world has been going through some dramatic changes over the past few years, with the COVID-19 pandemic and the situation in Ukraine coming on top of climate change and other environmental problems. Amid rising uncertainty about the future, what does humanity need to be doing to address these challenges?

Established in 2016 with the theme of engaging in "exploration of basics and theory based on an understanding of humanity and culture," Hitachi Kyoto University Laboratory[(1)] has been studying the societal challenges that Japan can expect to face in 2050 and looking at where to start finding genuine solutions, utilizing practices such as open forums to pursue this research[(2)]. Using this approach, how do they consider what sort of society Japan will have in

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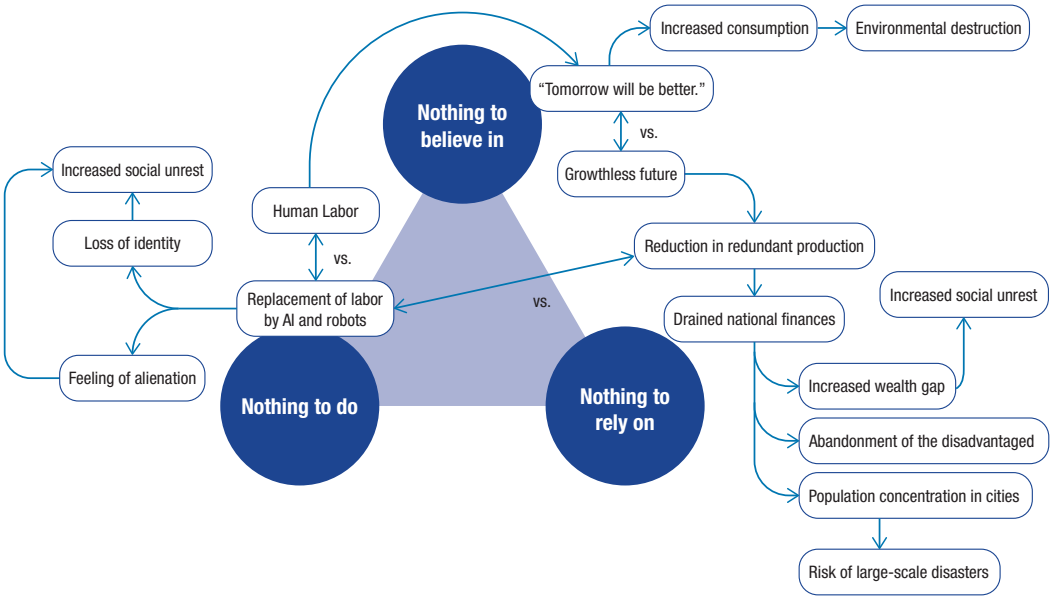
2050 and identify the issues it will face? Kazuhiro Ikegaya, a Senior Designer in Hitachi's Research & Development Group who has spent much time working at the Hitachi Kyoto University Laboratory, offered the following answer.

"Among the societal challenges we see Japan facing in 2050 are three things that will be missing from our lives, a trilemma of having nothing to believe in, nothing to rely on, and nothing to do. How can we stand our ground when we lack these things? While it is not a tangible solution, the conclusion we drew was that, rather than being a society that seeks only to be efficient and optimal, the first step would be to foster a sense of curiosity about human



Crisis 5.0: Exploring Societal Issues for 2050

The Hitachi Kyoto University Laboratory has put together a presentation entitled "Crisis 5.0: Exploring Societal Issues for 2050" that looks ahead to the societal challenges that Japan will be facing in 2050 and considers what will be needed from the universities and companies of that time. In addition to publishing this research on the web, it has also been collated into a book entitled, "Beyond Smart Life—Curiosity-Driven Society" (published in August 2020).

View of Kyoto University's Yoshida Campus, Home to Hitachi Kyoto University Laboratory

Since it was established at Kyoto University in 2016, Hitachi Kyoto University Laboratory has been engaged in research into the societal challenges that Japan will be facing in 2050 and how these can be solved.

relationships to encourage interest in societal challenges and practices. In other words, to get people to feel a sense of personal relevance or ownership about these matters."

Associate Professor Saeko Okada of the Research Institute for Humanity and Nature (RIHN) added the following comments.

"In 2050, babies born this year (2022) will be 28 years old and approaching the stage in life where they are thinking about things like getting married. To create a bright future for the next generation, everyone now needs to recognize the serious problems posed by societal challenges such as the global environment. However, there is a complex mix of factors involved, the issues themselves change from time to time, and there are no absolute answers. Put another way, all we can do is provide evidence that will suggest the way forward, but we are committed to sharing this evidence and knowledge with the wider public, listening to what they have to say, and then using this feedback to inform the actions being taken."

Associate Professor Miho Iwakuma of the Graduate School of Medicine, Kyoto University, who specializes in the study of medical communications, sounded a warning about the current overemphasis on seeking "right answers" and had the following to offer with regard to the divisions that have become more pronounced over recent years.

"Rather than pursuing perfection, what I believe will be important for the society of the future will be to make allowances for weakness. While manuals are taken very seriously in the medical field where I work, medical practitioners sometimes ask me how they should be communicating with their patients during consultations, a situation where manuals are not much help. Given that everyone sees things differently, rather than doing everything by the book, what I believe will become more important is to adopt an attitude that it is better to allow a degree of leeway and latitude so that each person can be dealt with in a way that best suits them."

Knowledge for Unraveling Large and Complex Problems

In August 2020, Hitachi Kyoto University Laboratory published a book entitled, "Beyond Smart Life—Curiosity-Driven Society" that summarizes its work looking into the societal challenges facing Japan in 2050[3), 4)]. One of the suggestions for how to break through the trilemma given in the book comes from Professor Mitsuyoshi Ueda of the Division of Applied Life Sciences, Graduate School of Agriculture, Kyoto University, who wrote about "education to stimulate the imagination." Along with the importance of bringing the arts and sciences together again and tying them back into society, he also calls for entertainment-based science education that makes the sciences more accessible. To put these words into practice, Hitachi Kyoto University Laboratory has embarked on a project to develop new digital content for education called "AR & MR Contents to Deep Dive into Societal Issues"[5)].

As Ikegaya explained, "Our specific aim was to create educational content using extended reality (XR), which includes virtual reality (VR), augmented reality (AR), and mixed reality (MR). This is because we saw the sense of realism provided by XR as a way to stimulate people's curiosity about societal challenges and practices. In other words, to get them to feel a sense of ownership toward these challenges."

The two themes of the content produced are "Pandemic" and "Climate Crisis," both of which are large and complex issues with a global scope. Ikegaya went on to explain how both themes represent problems that are difficult to solve in the sense that they pose numerous dichotomies, such as health versus the economy, in the case of the pandemic, and the environment versus the economy, in the case of the climate crisis.

"The aim of this project was not to come up with answers to the problems, but rather to encourage people to take on a sense of ownership. That is why we went out of our way to choose such difficult topics."

Once the project was underway, Hitachi Kyoto University Laboratory contacted Associate Professor Iwakuma to help incorporate input from students. She recounted how this came about, as follows.

"I received an e-mail from Ikegaya-san, who wanted me to put him in touch with some of my medical students. In response, I asked if I too could get involved as well as the students. I had enjoyed working in the past on projects involving collaboration between industry and academia, finding that people who work in the private sector have ideas and a sense of urgency that are a little different from what you get with academics."

As this was in 2020 when the COVID-19 pandemic was on the rise and when signs of an infodemic*1 were also apparent, Associate Professor Iwakuma's expertise in her specialty of medical communications played a significant role in preparing the educational material on the pandemic.

Likewise, for the Climate Crisis theme, knowledge was drawn from the RIHN with which Associate Professor Okada is affiliated. She spoke about this as follows.

"RIHN is a national research institute that was established 20 years ago with Professor Toshitaka Hidaka, who came from Kyoto University, as its inaugural director. It pursues research based on a philosophy that the roots of global environmental problems are found in human culture. To overcome the vertical barriers between universities, our approach to environmental research features multidisciplinary research that emphasizes a merger of the arts and the sciences and transdisciplinary research rooted in direct engagement between academics and the public. Whatever the project, we bring cultural and societal perspectives into our study of the environment. In this sense, I feel we have an affinity with Hitachi Kyoto University Laboratory and its theme of 'exploration of basics and theory based on an understanding of humanity and culture.'"

Associate Professor Okada also felt a desire to be part of the project. This was inspired by the potential she saw for a partnership with the FEAST's Future School Lunch project run by RIHN(6).

"The Future School Lunch project itself looks at the school lunches that form part of children's diets and is an educational resource for thinking about what sort of school lunches can be expected and how diets will change under four possible futures: if we fail to keep the temperature rise due to climate change below 2°C; if we fail to keep the temperature rise below 1.5°C; if foods are produced locally for local consumption; or if we continue to rely on imports. As part of this, we produced sample meals to give people a realistic sense of what future school lunches might be like. Unfortunately, the spread of COVID-19 made their use

*1 The spread via the Internet and social media of huge volumes of information of uncertain authenticity.

Scenes from In-person Workshops

Teachers and students at Kyoto University enjoyed animated discussion at a workshop where the participants were physically present, albeit with rigorous infection prevention measures.

impractical… This led to our involvement in this project and what we do instead now is use XR, having realized that it can give people a realistic idea of future school lunches just like the sample meals."

From a Multifaceted Workshop to a Single Scenario

How is this project proceeding in practice? Following the publication of "Beyond Smart Life—Curiosity-Driven Society," Hitachi Kyoto University Laboratory recruited volunteers from among Kyoto University students to participate in three workshops from October 2020 where they investigated what should go into the digital content. Although the pandemic meant that two of these workshops had to be held online, valuing face-to-face interaction, they managed to acquire a large venue and hold one of the workshops in person.

As Ikegaya explained, "Seven students participated in the workshops. For the pandemic theme, we brought together people with expertise in the study of medical communications, education, and visual media. Likewise for the climate crisis theme, we had people involved in civil defense research, public policy, social psychology, and Southeast Asian studies. Along with Associate Professor Iwakuma, Associate Professor Okada, and four people from Hitachi, the workshops were also attended by researchers from RIHN, including Professor Hein Mallee, who specializes in the study of ecohealth, and Assistant Professor Manabu Yamanaka, who works in the field of climate change. Along with considering multiple perspectives and attempting to unravel the relationships with societal challenges and our way of life, we also asked ourselves what sort of scenarios we should present in order to spur people into thinking about societal challenges. We engaged in discussion to pull together our thinking on these topics."

The workshop participants split into separate pandemic and climate crisis teams. The team addressing the pandemic considered scenarios across three different phases: learning from the past, understanding the present, and thinking about how the pandemic will impact the future. The climate crisis team likewise considered scenarios for three different phases: appreciating the severity of the problem, identifying the mechanisms associated with the challenges and how they work, and considering what is needed to encourage behavior change. With support from Hitachi Kyoto University Laboratory staff, scenarios were put together highlighting the original ideas of the university students and presented as five-minute videos suitable for posting on the web.

Associate Professor Iwakuma and Associate Professor Okada had the following to say about the outcomes of these three workshops.

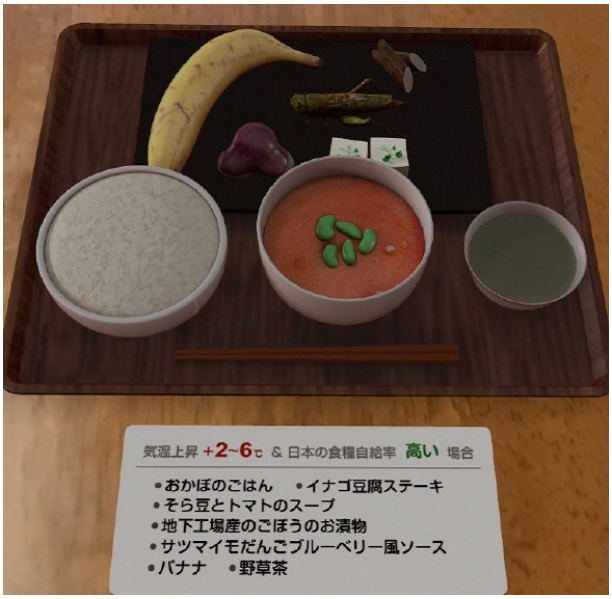
Electronic Picture Books on the Pandemic and Climate Crisis Utilizing XR Technology

The two electronic picture books on the pandemic and climate crisis respectively present their pictures and story in an easily understood form while also being annotated with comments from informed people. The books are posted on the Hitachi Kyoto University Laboratory website where they are accessible to anyone with a PC or smartphone.

XR: extended reality

"We learned a lot from the workshops and I personally found them to be very stimulating. It gave me insight into how the current pandemic is being perceived by the students who made the videos. Some of the lessons they took from the history of past pandemics such as the Spanish flu were quite different from those of someone with the perspective of a medical researcher. Medical sociology is also among my specialties, and the past is repeating itself even more so than I would have expected. I believe that the students learned a lot from the exercise, putting a lot of effort into presenting a visual take on that history in the videos they created." (Iwakuma)

"I talked about science art[*2] during the online workshops and I particularly recall the perceptiveness of the questions that the students put to me. When putting together the scenarios, I was also surprised at how the young students incorporated communication techniques with original ideas." (Okada)



Realistic AR Portrayal of the Future School Lunch

The electronic picture book on the climate crisis uses augmented reality (AR) to show sample Future School Lunch meals produced by the RIHN's FEAST project. A realistic portrayal is achieved by superimposing the images onto familiar surroundings such as the home dinner table.

Use of XR to Provide Realistic Experience

Getting people to feel a sense of ownership about societal challenges was one of the original aims of the project and a key consideration in producing the digital content was how XR could be used to achieve this.

As Ikegaya put it, "Without a three-dimensional immersive experience, the simulated experience will not feel realistic. That led us to use XR, the technology of the metaverse that is a hot subject right now. By wearing an MR device and taking part in the workshop led by a Hitachi Kyoto University Laboratory moderator, the participants were, through the use of holographics replicated in virtual reality, able to experience the circumstances associated with societal challenges and how they impact the world of today."

He also went on to explain the problems caused by the COVID-19 pandemic. The XR experience requires a venue where people can attend in person, something that is difficult to achieve for large numbers of people during a pandemic.

"All of this led to our decision to produce and publish scenarios that incorporate AR images suitable for viewing on a website. However, rather than just presenting our scenarios, we instead produced content that offered a wide range of perspectives by asking Associate Professor Iwakuma and other experts to share their expertise on video."

The web content offers an overview of society from the perspective of the pandemic and the climate crisis and is packed with additional material in forms such as further information, AR, and expert commentary. By sharing this content, the result was a program in which it is easy for anyone to get involved and take part. As youth, who are the primary target audience, tend to be much more likely to consume the content on a smartphone rather than a personal computer, the AR-featured website was optimized for smartphone browsing.

Associate Professor Okada had the following to say about the web content.

"The climate crisis content used AR to present samples of future school lunches that were more realistic than I might have imagined, they looked like the real thing. Whereas you can only see the actual meal samples by going to the place where they are kept, the great thing about AR is that you can view them in familiar surroundings such as your own home."

*2 Art that draws on the capabilities of technology, featuring the use of techniques such as AR and VR for movement and interactivity.

New Forms of Collaboration Made Possible when Challenges are Shared

Since the web content was put online, Hitachi Kyoto University Laboratory has continued to put out information about it in a variety of settings. This included the 26th United Nations (UN) Climate Change Conference of the Parties (COP26) held in Glasgow, UK in November 2021. At the conference, QR codes*3 linked to English-language material on the climate crisis were handed out to attending delegates from national governments and non-governmental organizations (NGOs), an initiative that resonated strongly with the younger generation of climate-related organizations.

As Ikegaya explained, "We also held a workshop in partnership with a lifetime education organization in Musashino City, Tokyo that was targeted at local elementary school students and their parents and gave them the opportunity to try out the content. The idea was to get the children of today thinking about questions such as what sort of lunches they would want to make for their children in a future in which eating habits have changed as a result of climate change. The workshop proved to be very interesting. The participants were asked to draw pictures and came up with ideas like making lunchboxes out of seaweed so you can eat the whole thing, or that they might be more likely to eat food derived from insects if it was made into *kyara-ben* (food made to look like people or media characters)."

In addition to an event planned for Shibuya, Tokyo in the fall of 2022 that gives Generation Z youth a chance to experience the climate change content for themselves, they are also looking for ways to further develop this resource.

Associate Professor Okada talked about this, saying, "At RIHN we have posted content on our website entitled 'Look! Global and Environmental Studies'(7). We have also launched a project to present and share the knowledge gained from 38 projects undertaken over the past 20 years and we look forward to continued collaboration with Hitachi."

Hitachi Kyoto University Laboratory intends to continue putting out this sort of content in the future with the aim of highlighting new societal challenges such as biodiversity. The people involved had the following to say about these plans.

"While issues like the climate crisis and the pandemic are vitally important, focusing solely on depressing topics will only end up driving people away. That would defeat the purpose, and it is why I believe it is crucial that we find ways to turn the issues into more interesting forms without scaring people too much. For example, there have been programs at elementary schools, etc. that enable people to experience what it feels like to be visually impaired. When you question the children about how they feel after going through these experiences, they all have considerate responses of wanting to help people in need, saying how tough it felt and that they now understood how difficult it must be for such people. While it is obviously important for people to understand the difficulties, I also think it would be good if, by using AR or MR to enable people to experience the interesting aspects of blindness, as well as the hard parts. They would also get a visceral sense of being connected as neighbors, understanding that the disabled are different from them, but not separate." (Iwakuma)

*3 "QR code" is a registered trademark of Denso Wave Inc.

"We want to continue updating the content while also promoting it more widely by means such as posting on social media, holding related events, or collaborating with influencers. Obviously, I would also like us to keep working in partnership with Hitachi Kyoto University Laboratory." (Okada)

"One idea that has been prevalent in society to date is that of sharing the accomplishments of people with everyone. Associate Professor Iwakuma spoke earlier about modern society being too focused on finding 'right answers.' What I would like to see is that we try to create a society in which, by sharing what we are not able to do, we can fill in the gaps that this leaves and support one another. That is why I see part of our role at Hitachi to be contributing to society through digital technology while also providing enjoyment and flexibility." (Ikegaya)

At a time when research is primarily aimed at optimizing systems or societies and making them more efficient, the faces of those people who actually live in those societies can become obscured. Based on a set of values that sees people as living in a mutually beneficial way with nature and society, Hitachi Kyoto University Laboratory intends to further develop this project and to maintain its pursuit of new innovations that help the digital realm, people, and society move forward in tandem.

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