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Leveling Up Universities!

University
Transformation
Fueled by DX
Strategies



As Japanese universities continue to evolve and further increase the quality of their education and research, they cannot avoid changes brought upon by moves to utilize information and communication technology (ICT), known as digital transformation (DX). On top of this, the emergence of generative AI (artificial intelligence) has the potential to dramatically accelerate their transformation. The Academic eXchange for Information Environment and Strategy (AXIES), which has more than 200 member universities and research institutes, is working to solve the common DX issues faced by universities and to develop human resources. AXIES President Takafumi Aoki, who also serves as Vice President, Provost, and Chief Digital Officer (CDO) of Tohoku University, and Sadao Kurohashi, the Director-General of the National Institute of Informatics, discussed the background and challenges of DX at universities, as well as the impact of AI.

Interviewer

TAKI, Junichi

Science Journalist

There is no single formula for success

—In your lectures, you often say that higher education is a growing industry. While this is certainly true overseas, in Japan, it's rare to hear people say this because of larger concerns over issues such as the declining birthrate.

AOKI: The global trend among universities is to evolve into knowledge management entities. More countries around the world are also recognizing the need to value higher education institutions. The Trump administration in the U.S. is currently shaking up the management of leading universities such as Harvard University. The U.S. has long faced social issues such as soaring tuition fees, which has eroded trust in universities. Through research, education, startup development, and other such activities, universities have become key players that exert major impact on the structure and policies of their respective countries. The current situation in the U.S. and the heated media coverage of it also highlights the importance of the role that universities play.

Higher education in the U.S. and the UK, which Japan has used as a model (reference), has grown to become big business. While Harvard and Stanford are often the topic of discussion in Japan, university business models come in different shapes and sizes.

There is no single formula for success. For example, there is a skills-first approach. Rather than studying a wide range of topics, as in traditional university courses, students that want to gain specific skills or knowledge are given the opportunity to study via short modules. Proof of acquisition is then given in the form of micro-credentials. Arizona State University in the U.S. is known for placing more importance on wide accessibility than on student selection. Data shows that the university has approximately 180,000 enrolled students, of which more than 70,000 are online students. —A sign that they are utilizing ICT.

AOKI: In Japan, only half of an undergraduate student's credits can be gained through online courses. This is because of a unique system that separates correspondence courses from on-campus courses. The only difference between the two is the way lectures are delivered. Also, accounting rules that emphasize breaking even within a single fiscal year have hindered universities from making strategic investments. While gradual progress is being made with reforms, reviewing these regulations is important for the growth of universities.

The use of AI and shared educational content across universities is key

KUROHASHI: Regulations will

certainly have an impact. However, I believe that AI will serve as a major opportunity for change. As AI is increasingly incorporated into university research, education, and management, I believe that we will need to gradually review the systems in place.

Right now, the bigger challenges lie with AI itself, such as hallucinations (i.e., incorrect or misleading information). In six months to a year, however, advancements in AI will likely enable it to largely overcome these issues. Research will change dramatically as a result. AI agents will be able to consider what is needed, retrieve and analyze information from cyberspace, and present research themes. Sooner or later, AI will be able to conduct physical experiments, obtain results, and write papers. When such a world becomes a reality, we will need to adapt quickly to change and review our educational curriculums to determine what kind of research and education we should provide. Assuming the use of AI, it will no longer make sense for all universities to individually prepare and provide the same educational content. The creation of shared content will become key.

—As President, can you tell us what kind of activities AXIES is carrying out in this regard?

AOKI: We aim to bring about advancement to education, research, and management at insti-



AOKI, Takafumi

Graduated from the Graduate School of Engineering at Tohoku University with a PhD in engineering. Research interests include signal processing, image recognition, computer vision, biometric authentication, forensic dentistry and personal identification, high-performance computer systems, cryptography, and security issues in computer systems. He has been a professor at Tohoku University since 2002 and Vice President since 2012. After serving as an officer at numerous academic societies, he was appointed as President of the Academic eXchange for Information Environment and Strategy (AXIES) in 2023.

higher education and academic research by applying ICT. Our goal is to share methodologies and support tools and to improve the ICT utilization capabilities of faculty, staff, and students. Both public and private universities that face challenges in promoting DX have become our members. The number of member institutions is growing, currently standing at 206. Companies are also signing up to become members to gain business opportunities. Many small universities seeking a different business model from large universities like the University of Tokyo and Kyoto University are also members. We cover a wide range of topics, from the use of supercomputers to research data infrastructure, online education, and even operational reform. Recently, we have seen an increase in university administrative staff making presentations on the topic of operational reform at committee meetings and annual conferences.

It's important to recognize that DX is omnidirectional. It touches all aspects of university business, including education, research, industry-academia collaboration, startup development, and management. In one of his books, Kenichi Ohmae argues that digital transformation is the innovation of business models leveraging digital technology. I believe that the same applies to universities, that digital transformation is an innovation of university business models.

The ICT field is facing a signifi-

cant labor shortage. I think that we should come together to resolve issues surrounding infrastructure that can be shared. As there is a high degree of systemic uniformity among Japanese universities, the quality of education and other areas is guaranteed. It would be prudent to leverage this strength. Rather than working to solve issues on an individual corporate basis, common issues should be resolved across the board, and individual universities should develop their own unique business models. This is the aim of AXIES' activities. Key people from NII have also participated in these activities, providing considerable support. NII has made significant contributions by providing and operating research data and authentication infrastructure thus far, but I look for it to play an even bigger role in standardizing a broader range of information infrastructure and integrating operations.

KUROHASHI: This is a major challenge for NII, so I think we need to buckle down and take steps to tackle it. NII is not working alone. Many university researchers are participating in discussions on this front. While Japan's 7th Science, Technology, and Innovation Basic Plan, which is currently being formulated, sets out an overarching direction, advances in ICT and AI will increase the need for the sharing of resources. We plan to gradually create a system that

can meet this need.

AOKI: In that sense, now is a very important time for the evolution of higher education in Japan.

KUROHASHI: Rather than addressing generalities, pinpointing where to start is also important. In this regard, I feel that Tohoku University's DX initiatives are gaining momentum. A team has been formed to tackle operational innovation, with the results being rolled out to universities across Japan.

AOKI: We have also formed an alliance joined by staff from over 100 universities and other institutions. Because we are all facing the same challenges, it has spread quickly at the grassroots level. The involvement of upper management and finance departments is essential to promoting DX in business operations. The speed of deployment depends on whether there are people ready to drive these initiatives forward. Things should move quickly once a system for horizontal deployment is in place.

**Requests to NII,
an Inter-University Research
Institute Corporation,
and related initiatives**



—Professor Aoki, what are your current expectations for NII?

AOKI: I think the public is most concerned about whether Japan can create AI that can compete on the global stage, and whether their data will be protected. Specifically, there are issues known as data sovereignty and sovereign AI (the utilization of domestic data and computing infrastructure to independently develop and have sovereignty over its own AI system and data). I believe that the uniformity of the research data of Japanese universities will make it easy to integrate. The integration of infrastructure will be key to competing on the global stage. Furthermore, it makes more sense to consider rules for utilizing data and AI in one place, rather than have them created by different universities individually. I believe that such integrated strengths unique to Japan will serve as the driving force behind NII's sovereign AI development, and that it will generate significant interdisciplinary value not found in other countries.

KUROHASHI: We are pushing ahead with our initiatives based on the very circumstances that Professor Aoki has pointed out. While we're not confident that we can compete on equal footing with the likes of Google, we believe that a framework like this is necessary to ensure Japan's sovereignty, and as such have gathered Japan's top researchers to carry out this development. Japan has some serious brainpower, even when compared to the rest of the world.

Currently, digitized data from books held by the National Diet Library cannot be used for AI. This is due to the concerns of authors. However, we believe that the crux of the matter is how the data is used. We will use the data we are given access to for clear purposes, such as education. We want copyright holders to understand that entire copies will not be print-

ed, and intend to use the data used to train the sovereign model for education and research, including for elementary school students, to firmly ensure sovereignty. As the first step in such initiatives, we have started conducting AI learning experiments using digital data from government publications provided under our agreement with the National Diet Library.

In this AI for Science era, it's crucial that data crosses multiple disciplines. The social challenges we face cannot be solved by a single academic field alone. We also need to incorporate data from the humanities and social sciences.

We need data to create value unique to that specific country. Transparency is a must when it comes to using data. Data providers must be able to monitor how their data is being used. Assuming transparency is ensured, we would like newspaper publishers and other organizations to provide their data at reasonable prices. Our development concept is to use this data for pretraining to create knowledgeable people that avidly read newspapers. We want them to understand that this will benefit Japanese education, so that we can incorporate Japanese data and ensure security so that people can use it with confidence. I hope that sovereign AI, which provides peace of mind by providing clarity on what data it was trained on and whether it behaves properly and without error, be used in social services such as education and healthcare.

AOKI: The mission of creating new value is an important one. DX is needed to create value unique to Japan. At the same time, this obviously presents challenges. As efficiency improvement is essential for survival, productivity needs to be increased. NII should also be able to contribute meaningfully in this area. I would like NII to support the DX of universities on both of these fronts.

A Word from the Interviewer

In 2017, roughly ten years after national universities were converted to independent administrative entities called national university corporations, the Science Council of Japan published a proposal titled "Reforming Education and Research at National Universities and National Support." The proposal argued that advanced university networking is necessary for national universities to continue contributing to society amid increasingly tight national finances. It seems to conclude that the only way to free up room for reform under fiscal constraints is through the use of ICT, such as to enable the sharing of financial accounting systems and curriculums.

"DX" may now feel like an overused buzzword. However, this conversation reaffirmed its undeniable importance in the context of university reform. By adding AI to digital transformation, I hope to see universities go beyond pursuing their own growth models and fulfill their role in fostering a knowledge service infrastructure that contributes to society as a whole.



TAKI, Junichi: Joined Nikkei Inc. after graduating from Waseda University's School of Political Science and Economics. He has reported on topics such as science and technology research and development sites, science and technology policy-making processes, climate change, and energy policies since the mid-1980s. After leaving Nikkei Inc. in 2024, he served as Executive Secretary of the Japanese Association of Science and Technology Journalists.



KONDO, Tohru

Director, Information Media Center, Hiroshima University
Professor, Graduate School of Advanced Science and Engineering, Hiroshima University



YAEGASHI, Rihito

Head of Information Technology and Media Center, Kagawa University
Head of Digital Transformation Research Center, Kagawa University
Professor, Program in Informatics, Department of Engineering and Design, Faculty of Engineering and Design

DX at Universities and the Forefront of DX Personnel Development

Digital transformation (DX) is currently a major theme in university management. How is it being promoted at individual universities, and what challenges do they face? And what should the National Institute of Informatics (NII), an Inter-University Research Institute Corporation, do to resolve these issues? We invited Professor Tohru Kondo of Hiroshima University and Professor Rihito Yaegashi of Kagawa University, who are spearheading DX efforts at universities, to discuss their opinions on these matters with Professor Kento Aida of NII.

Facilitator

AIDA, Kento

Vice Director-General, National Institute of Informatics
Professor, Information Systems Architecture Science Research Division, National Institute of Informatics

Interview and composition: KAWABATA, Hideki,
Photos: SUGISAKI, Kyoichi

AIDA: Today, from the perspective of promoting DX as part of a university IT department, I would like you to speak openly about what universities can do to promote DX and foster DX personnel, as well as what you expect from NII, which supports these efforts. First, could you each briefly introduce yourselves and tell us about the DX initiatives at your respective universities?

KONDO: I currently serve as the Director of the Information Media Center at Hiroshima University. I've been in this position for about a year and a half.

The Information Media Center is responsible for everything from the infrastructure aspects of planning, designing, and implementing university-wide information systems

like campus networks and computer systems, to learning management system (LMS) operation, information security education, and information literacy education. Meanwhile, as a faculty member of the Graduate School of Advanced Science and Engineering, I supervise and collaborate with IT students on research. However, this is also mainly related to operating technology, and involves actually developing new network technologies and systems, running them, evaluating them, and compiling the results into research papers. That roughly sums up what I do.

YAEGASHI: Two years ago, Kagawa University launched an organization called the Integrated Center for Informatics, which has four information-related centers under it: the Information Technology and Media Center, the Cyber Security Center, the DX Research Center, and the Educational Information Support Center. Previously, only the Information Technology and Media Center existed. However, as the role of IT departments at the university has grown, the need for in-depth discussions and initiatives for each role has also increased. I am currently the head of the Information Technology and Media Center and the DX Research Center.

Echoing what Professor Kondo has said, I belong to the Program in Informatics at the Department of Engineering and Design under the Faculty of Engineering and Design at Kagawa University, where I have a laboratory and mentor students. Including the three adult graduate students in their doctoral program, there are a total of 15 students in my lab.

AIDA: While both of you are involved in promoting DX at your respective university's IT departments, I imagine that each university faces different challenges when it comes to promoting

DX, and that they are working to address them based on their own policies. I think Hiroshima University and Kagawa University are both good examples of cutting-edge initiatives, but could you enlighten us as to how each university is proceeding with these efforts?

KONDO: At the end of fiscal 2020 (January 2021), Hiroshima University formulated the Hiroshima University Basic Plan for DX Promotion. This plan looks ahead to Hiroshima University's information environment ten years into the future and how its education, research, and support operations will utilize digital technology. Every three years, we check the implementation progress and set out key priorities that concern the entire university to promote DX. A distinctive feature of the plan is that it clearly defines what the university's DX initiatives entail and sets forth basic policies and specific activities for the medium to long term. The plan is being spearheaded by the Department of Information's Information Promotion Group under the Financial and General Affairs Office, which is an administrative IT department. We at the Information Technology and Media Center are cooperating with them.

The plan incorporates three major directions: research DX, education DX, and administrative work DX. As mentioned above, it's a plan that is reviewed every three years. We are currently in its second phase, which spans 2023 to 2025. This phase focuses on five key areas: (1) the utilization of education and learning data and digitization of educational content, (2) research data management, (3) the quantitative expansion and qualitative enhancement of DX personnel, (4) the enhancement of services that support the lives and activities of students, etc., and (5)

the business continuity and advancement of operational support services. As the second phase will end at the end of this fiscal year, now is the time to take stock and think about what action to take next year onward.

AIDA: I believe that every one of these five key themes Hiroshima University has prioritized this fiscal year is extremely important. Have you noticed any discrepancies in progress or any issues that have arisen as you've carried out these initiatives?

KONDO: Initiatives regarding the business continuity and enhancement of operational support services, research data management, and the digitization of educational and learning content have been ongoing since the previous fiscal year. While progress has been varied, I believe we're steadily moving forward on the whole. One area we've been focusing on this fiscal year is the quantitative expansion and qualitative enhancement of DX personnel. In particular, we've deployed various training and human resource development programs on in-house app development using low-code/no-code tools and the use of generative AI. I feel that we're proactive in improving the skills of staff outside of IT departments as well.

Of course, there are some areas where the results are difficult to see, which may make progress appear slow on the surface. But I don't think there are any areas where we haven't made any progress at all.

AIDA: Next, I'd like to ask Professor Yaegashi about the initiatives being carried out at Kagawa University.

YAEGASHI: Our IT departments develop network and system infrastructure, and builds various IT systems for education and research and university operations. But it's not just a matter of "we



KONDO, Tohru
Professor and Director, Information Media Center, Hiroshima University. Concurrently serves as Professor for the Informatics and Data Science Program, Graduate School of Advanced Science and Engineering, Hiroshima University. Based on his interest in new technologies, he is utilizing various services provided by NII with a “let’s give it a shot” attitude.

build it and then our job is done.” What’s important is how much the operation of such infrastructure and systems contributes to education and research and university operations. There are actually systems at our university that are not being used effectively. To prevent this from happening, we are taking measures with a strong focus on how we can link these systems to profits for education and research, university operations, and other areas.

Returning to my previous point about the systems that have been deployed but are not being used effectively, according to a survey by a consulting service, 80% of the functions of developed systems are not being used. It’s said that to create a system that will actually be used and properly utilized, it is essential to have not only specialized knowledge in areas such as design and development methods and programming, but to also possess knowledge of the target business, otherwise known as domain knowledge. In the case of systems that will be used at universities, it’s the university itself that has this domain knowledge. So, in order to create such systems, it makes more sense for the system development to be carried out by the university in question. With this in mind, we set out to build a system development structure within our university. Basically, this is to develop the system ourselves in-house. When doing so, we decided to adopt an agile development process rather than a traditional one like the wa-

terfall model. As Kagawa University’s Department of Engineering and Design has positioned design thinking at the core of its education, it already had an educational program in place geared toward developing design thinking skills. As such, we are currently developing the system in-house using a development process that is a mix of both agile development and design thinking.

Meanwhile, it has been pointed out that Kagawa University’s dispersed campuses are hindering management. Even though the same systems are installed at each campus, the differing operations between departments has led to problems with the quality of the data generated. To address this, the university formulated a DX promotion strategy it dubbed the Digital ONE Strategy, which aims to standardize the different operations of each department while also producing high-quality data. In other words, the strategy is based on the concept of becoming one university in the digital world.

AIDA: The development of DX personnel is also essential to promoting DX. I think this is even more important when it comes to developing systems in-house. How is Kagawa University addressing this?

YAEGASHI: Human resource development is important. While it may be possible to recruit talent in major urban areas like Tokyo and Osaka, our university is struggling to secure IT-related personnel. It’s not that we’ve given up on recruit-

ing people externally, but that we are also working toward developing our own personnel in-house. We aim to develop employees that can not only develop business systems in-house and analyze business data, but can also analyze operations using design thinking and come up with ideas to improve them.

When it comes to in-house system development, our staff have only developed really simple systems that IT experts like yourselves might dubiously ask, “Is that really a system?” However, our staff have developed over 200 of these systems to date. Earlier, I mentioned that most of the functions that are developed go unused. In our case, over 80% of the systems developed by our staff are still currently being used in our business operations. As such, I think it’s important to utilize on-site domain knowledge in system development.

KONDO: Professor Yaegashi and many others have done a very good job of explaining Kagawa University’s initiatives, especially the importance of in-house development. While many universities are currently working to develop systems and services in-house, as someone involved in a university’s IT department, I feel that the fact that they are not just implementing in-house development but are also actively communicating its significance and future direction is a positive initiative and a good example to follow.

AIDA: I think a major issue in particular is knowing what kind of human resources will be needed going forward. What are your thoughts on this?

YAEGASHI: You know, local companies in Kagawa Prefecture often tell us that Kagawa University’s IT students never get hired by local companies. So, when I asked them what kind of IT professionals

they were looking for, something became clear. In addition to traditional IT professionals such as software engineers, network engineers, and security engineers, in recent years new types of IT professionals have emerged, such as designers and data scientists who consider system specifications and approaches from a higher perspective, and business architects who connect these to business operations. The latter group is the kind of IT professionals local companies are actually looking for. Even at universities, we believe that designers, data scientists, and business architects are more suitable for promoting education DX, university IR, and real-time open access.

KONDO: Until now, IT-related personnel have mainly consisted of software engineers and network engineers. However, the reality is that there are not enough on-site staff to handle even these traditional types of engineers. In such a situation, I feel that it will be even more difficult for us to develop new types of specialized personnel, such as data scientists and business architects. This is why we need to think carefully and from a long-term perspective.

AIDA: This is a very important issue. I think Kagawa University and Hiroshima University are examples of universities that are doing well with well-established systems. On the other hand, there are many universities that do not have IT-related faculties or departments, and it is not possible for a single university to do everything. With regards to human resource development, I can see you wanting to make joint efforts in areas with common ground or wanting NII to fully take on this responsibility. What are your thoughts on this?

YAEGASHI: In response to concerns that it would be difficult for a single university to train IT-related



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staff, Professor Kondo and I have discussed a scheme for universities to collaborate on human resource development using university joint usage/research centers, as well as the more concrete idea of establishing a joint graduate school.

For example, there are a fair number of cases where conventional software and network engineers transfer from vendors and other organizations, but I think that universities often struggle to train new types of IT-related personnel such as data scientists and business architects on their own, and do not know what to teach them.

KONDO: The National University Corporation of Information Processing Center Council (NIPC), a community of IT centers at national universities, also discussed sustainable IT infrastructure operation and human resource development as key issues for the current fiscal year. During these discussions, it seems that a major common concern among many participants was that, although each university is undertaking various human resource development initiatives, the number of people who operate the IT infrastructure itself is decreasing.

To begin with, university staff are often transferred to different departments every two to three years, which is one of the reasons why human resource development is lacking. It is also difficult for IT-related specialists to establish a solid career path. This problem is not something that can be solved in a year or two. Rather, I

think it needs to be tackled over the long term, such as in ten-year increments. However, at the same time, the scope of responsibilities of IT departments is rapidly expanding, and the speed of change is also accelerating. This inevitably increases the burden of their daily operational tasks, forcing them to become limited to closed, individualized responses. This makes it difficult to evolve into systematic human resource development. Of course, as technology is constantly evolving, it's not the technology itself that's important, but the willingness to keep learning. I see potential in creating a university-wide community where people can share such views and motivate one another.

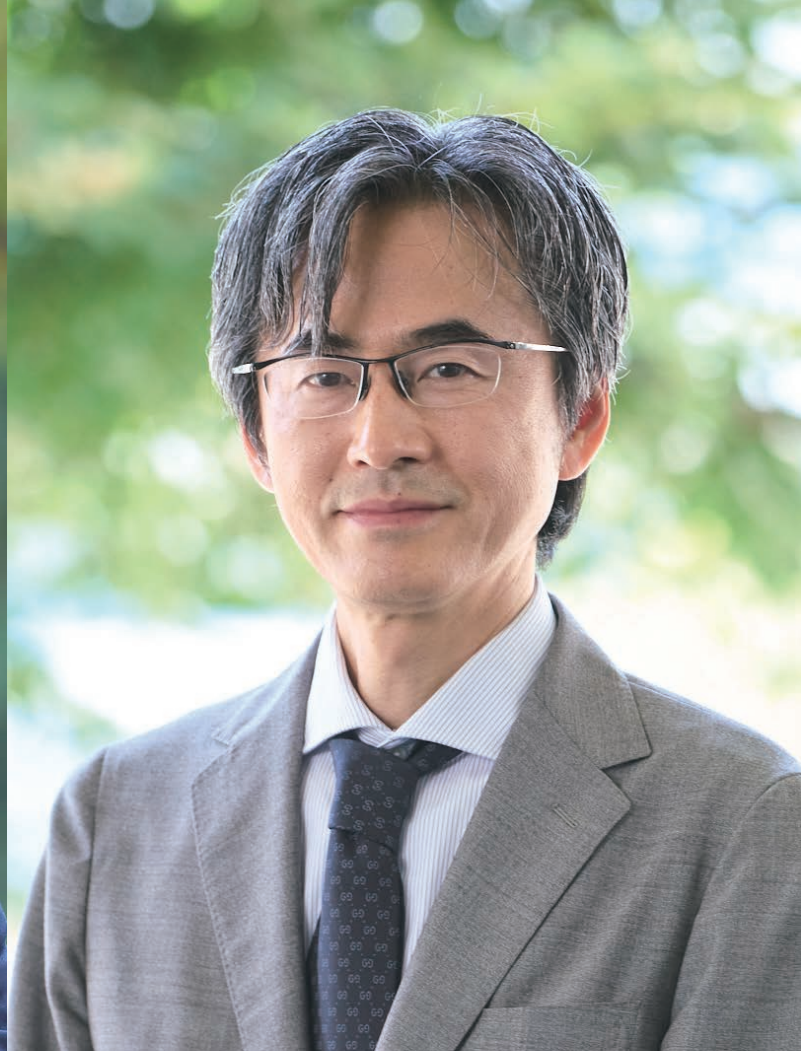
Furthermore, in terms of developing human resources in regional areas, I'd like to see core regional universities, such as Hiroshima University and Kagawa University, serve as hubs to play a role in coordinating cross-university collaboration. In that case, I would like NII to monitor the initiatives being carried out in each region and drive their standardization and institutionalization.

Of course, bottom-up efforts, where individual universities take the initiative to change their mindsets, are essential. However, there are limits to this alone. Unless positioned as national policy, it will be difficult to operate such systems in a sustainable manner. This is precisely why I would like NII to firmly raise the flag and co-create this momentum.



HIRATA, Norihiro

Senior URA, Research Strategy and Promotion Division, Headquarters for Co-creative Future Sciences, Hiroshima University Academic and Social Collaboration Office



KOSHIMIZU, Hisatsugu

Professor/Head of Office, Office of Research Administration, Research Promotion Headquarters, Fujita Health University

URA-led Cultural Reform of Research Data

Facilitator

YAMAJI, Kazutsuna

Professor, Digital Content and Media Sciences Research Division, National Institute of Informatics

Interview and composition: TAJIMA, Akihiro
Photos: SUGISAKI, Kyoichi

Actively sharing research data both within and outside universities and using it to strengthen research capacity—that is what Hiroshima University and Fujita Health University are trying to do to drastically advance research data management (RDM), which also represents a “culture change,” led by URAs,¹ who are the specialists responsible for promoting university research. We spoke to two people involved in these efforts about the benefits of promoting RDM from their perspectives as URAs, the challenges that lie ahead, and the role that the National Institute of Informatics (NII) can play.

Current state of DX at universities

YAMAJI: Fujita Health University and Hiroshima University are both J-PEAKS² selected universities. Please tell us about the current state of DX with regards to research data.

KOSHIMIZU: Fujita Health University is a private, single-discipline university. As its founder, Keisuke Fujita, was a physician and biochemistry researcher, the university places importance not only on education but also on research. Over the past decade in particular, the university has strengthened its research capacity by establishing research organizations that bring together enthusiastic junior and mid-career researchers from both within and outside the university, led by top researchers in fields such as psychiatry and neurology, regenerative medicine, oncology, and infectious diseases. Against this backdrop, we are gradually establishing a system for sharing and utilizing research data.

YAMAJI: What specific initiatives are you carrying out?

KOSHIMIZU: At our university, the President also serves as Director of the Research Promotion Headquarters, which is made up of multiple research departments and divisions. We share the status of each research project on a scheduled basis through bi-monthly headquarters meetings. Within this, the Office of Research Administration, which I head, supports the evaluation of research capacity, the acquisition of research funds at each department, and the dissemination of research

results. As part of these efforts, we are also responsible for RDM initiatives. Last year, we applied jointly with our library for the Open Access Acceleration Project and were selected, which led to the establishment of the Open Access & Open Science Promotion Committee (OA/OS Committee). Committee members include professors representing their respective departments, professors with experience as editors-in-chief of academic journals, and professors managing our university's database. Together, they are working to formulate a research data policy that will serve as a guideline for data management.

HIRATA: Hiroshima University has been selected for programs supported by the Japanese government, including J-PEAKS, that aim to strengthen and promote research capacity. Through these programs, we are working to strengthen our functions as a research university. Like Fujita Health University, we have a URA organization at the core of our research promotion efforts, and have a system in place that enables us to flexibly manage research activities through support for acquiring external funding and other supportive measures. I believe that the effectiveness of these URA functions has greatly contributed to improving Hiroshima University's research capacity. With regards to research data management, we formulated the Hiroshima University Policy for Research Data Management, Disclosure, and Utilization in fiscal 2021. However, subsequent changes in the organizational structure and research environment made it necessary to

update this policy.

In fiscal 2024, Hiroshima University was selected for the Ministry of Education, Culture, Sports, Science and Technology's (MEXT) Open Access Acceleration Project,³ which led to collaboration between URAs, our library, the Research Strategy Group, Research Support Group, Information Promotion Group, and the Department of Intellectual Property to establish a university-wide system for promoting open science and open access. Multiple departments collaborated from the application stage, and the adoption of the project sparked a rethink and the launch of new initiatives across Hiroshima University as a whole. URAs are taking the lead in promoting this project, carrying out activities that contribute to strengthening research capacity. To raise researchers' awareness of open science and the importance of research data management, we actively introduce GakuNin RDM, which is a research data storage and sharing cloud service provided by the National Institute of Informatics (NII). In doing so, we aim to further strengthen Hiroshima University's research infrastructure by deepening understanding of the importance of managing and sharing research data.

YAMAJI: URAs not only acquire research funding, but also bolster research capacity by realizing open access and open science through data management. This is the kind of “URA DX” you're working on, I see.

KOSHIMIZU: Turning to research data policy, Fujita Health University is currently sharing its draft and soliciting opinions from within the

HIRATA, Norihiro

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university with the aim of incorporating its unique characteristics as a recognized research university. For example, when a paper is published in an academic journal, it is assumed that supporting data will be submitted if necessary, but refusing to do so when actually requested is problematic in terms of ethics and research integrity. We plan to include in our policy explanation that we ask researchers to refrain from concealing research data without reasonable cause.

YAMAJI: The view that data should be shared as widely as possible because research is funded by public research funds, and that the disclosure of research data should be used as a strategic advantage for research, is quite different from traditional research culture. In light of this, we could also say efforts are being made to achieve a culture change in research from the researchers' perspective as well.

The challenges of research data management and the solutions thereof

HIRATA: With regards to URA commitment to research data management, I feel that Hiroshima University is currently in a transitional period. The formulation of the Policy for Research Data Management, Disclosure, and Utilization in 2021 was led by members of the Hiroshima University Library, responsible for publishing papers, IT departments responsible for data infrastructure, and administrative departments responsible for research promotion and support. No URA was part of this activity. While this is one approach, I also hear from these departments

that, while they have opportunities to interact with researchers, they do not fully understand the processes through which research data is generated in the research field. Therefore, a new initiative has begun in which URAs, responsible for bolstering research capacity, take the lead in committing to research data management. To date, URAs at Hiroshima University have built a strong track record through their focus on supporting external funding acquisition. We are also working to ensure that our role in research data management is recognized and understood as part of our URA duties.

KOSHIMIZU: I think carrying out reforms from a researcher's perspective requires people who are researchers themselves with first-hand experience of the situation on the ground to take the lead in driving these efforts. I believe that our university understands this and has entrusted URAs with the role of leading RDM.

HIRATA: The point of a research data management policy is not just to formulate one, but to also ensure that it is properly shared among researchers and is implemented. I have practical experience in the research process, from upstream (research planning, obtaining external funding, etc.) to downstream (technology transfer, industry-academia collaboration, etc.), which has given me a bird's-eye view of research activities at research universities. I plan to propose the importance of research data management to researchers and university executives while also forming a framework through which research results can be shared both inside and outside of universities and utilized in society,

thereby enabling researchers to forge ahead with their research in pursuit of their dreams.

YAMAJI: It's unprecedented for a university that has formulated a research data policy early on to then go on to update it.

HIRATA: In this regard, the framework of the Research Data Ecosystem,⁴ which NII is playing a central role in building, has been a major source of support. This ecosystem contains a system for sharing the initiatives being carried out in other regions. Seeing and hearing about the initiatives of many other universities is what made me realize the necessity to update our own data policy. In fact, it was through this open access system that I was able to deepen my understanding of open science in such a short period of time.

KOSHIMIZU: A challenge for our university is the difficulty of understanding the full picture of the data. The OA/OS Committee is attempting to create a bottom-up data repository at the course and researcher level. We're working on this by conducting surveys, and it looks like we'll be able to collect and manage metadata, at least, using GakuNin RDM. Meanwhile, we're also working on projects to handle large amounts of data in a top-down manner, such as forming joint ventures with companies to utilize medical big data and handling clinical data across universities. Some of these projects are being run independently, so we're discussing how best to understand and manage these data sets.

YAMAJI: Since we're trying to fit new guidelines into different research that is being conducted heterogeneously, it's difficult to put together a one-fits-all ap-



KOSHIMIZU, Hisatsugu

Graduated from the Graduate School of Science at Osaka University with a PhD in science. His specialization is in neuroscience. He joined Fujita Health University in 2011 after working at the National Institute of Advanced Industrial Science and Technology and the National Institutes of Health (NIH) in the U.S. Since 2018, his main mission has been to strengthen the university's research capacity as a member of the Research Promotion Headquarters. He was appointed as Head of the Office of Research Administration in 2023. He also serves as a liaison for the J-PEAKS project.

proach. On the other hand, governance won't work if the rules are too lax, which would ultimately be detrimental to researchers and organizations.

HIRATA: At Hiroshima University, we plan to formulate implementation procedures for each research area based on university-wide policies. We anticipate research data management procedures differing between research fields, meaning that even if we roll out a uniform research data management policy, it may result in resistance from researchers in the field, putting us in a tough spot. Of course, implementing research data management will require a certain amount of mindset change and effort on the part of researchers. This is why, rather than forcing it upon them as an obligation, we are aiming to emphasize the benefits, such as how it will solve the difficulties researchers face in managing their research data, and encourage them to accept it with an open mind.

KOSHIZUMI: Previously, the most important evaluation indicator was whether a paper was published in a journal with a high journal impact factor (IF). Nowadays, however, universities and researchers are being evaluated based on the number of citations each paper receives and other related indicators. URAs have been promoting this trend for the past five years or so. At the same time, we have established an incentive system in which the number of citations a paper receives is used to assess internal research funding. Through these initiatives, I believe that we have raised awareness of the notion that open access means that more people read the paper and

the number of citations increases, which in turn improves its evaluation, making it easier to obtain research funding and also leading to promotion.

YAMAJI: With the emergence of URAs such as yourselves at universities, trying to figure out the best DX approach while tackling the various dilemmas that pop up, I feel that the way data is managed at universities is undergoing major changes.

What NII should do

YAMAJI: Amid such circumstances, I believe that NII will also need to play an interdepartmental role, encouraging cross-institutional collaboration and community building. What kind of role do you think NII should play?

HIRATA: In promoting research data management, maintaining and managing large-volume data storage at each university will work as a significant financial burden. Which is why it would be helpful if NII took on the operation of a system that would enable beneficiaries to utilize a common infrastructure in a manner similar to a national data center at a reasonable cost. As a university, our goal is to continue ramping up our use of research data management systems, such as GakuNin RDM provided by NII, and help implement and maintain data storage systems.

KOSHIZUMI: I personally consider incentive design to be extremely important. Unless it becomes an ecosystem that makes everyone happy, ultimately, it will not be sustainable. In this regard, because the proportion of indirect costs received by administrative staff sup-

porting research in Japan is considered low, I would also like to make adjustments to ensure that talented administrative staff are highly motivated to carry out such work. If NII were to also support information sharing in this area, I think it could prove extremely advantageous for Japan's research community.

YAMAJI: I see. So, data management and open science are becoming important in ensuring the sustainability of the people who support research at the ground level. In this respect also, I feel that NII needs to go beyond simply providing infrastructure and tools, and also create a forum where sensitive information and practical knowledge can be shared effectively.

*1. **URA:** University Research Administrator. This is a position within universities or similar institutions that supports research advancement through activities such as obtaining external funding, formulating research strategies, and promoting industry-academia collaboration.

*2. **J-PEAKS:** Program for Forming Japan's Peak Research Universities. This is a government program that supports the development of an environment necessary for regionally-rooted universities with strengths in distinctive research fields, enabling them to accelerate international expansion and societal implementation of their research activities.

*3. **Open Access Acceleration Project:** This is a MEXT project that supports the development and advancement of systems for managing and utilizing research outputs at universities and similar institutions (such as institutional repositories), thereby accelerating infrastructure development and system reform toward immediate open access.

*4. **Research Data Ecosystem:** This is a mechanism that connects and circulates research data across disciplines so that researchers, universities, government bodies, enterprises, and other parties can share and utilize it.



NODA, Ayaka

Professor, National Institution for Academic Degrees and Quality Enhancement of Higher Education



HORI, Masumi

Project Professor/Assistant to the President, Osaka Kyoiku University

University Transformation Driven by Micro-credentials

Amid its declining birthrate and aging population, lifelong learning and reskilling are issues that cannot be overlooked in the development of Japanese society. Hopes are rising for micro-credentials, which certify the outcomes of short-term learning experiences geared toward acquiring specific knowledge and skills, as well as for digital badges, a digital representation of these outcomes, as the key to achieving this.

Professor Ayaka Noda, who has researched higher education policy, and Project Professor Masumi Hori, who has researched online education, were joined by Project Assistant Professor Chikako Nagaoka of the National Institute of Informatics (NII) to discuss the current situation regarding micro-credentials and digital badges around the world and in Japan, as well as the challenges and future possibilities on this front.

Interview and composition: MIWA, Yoshiko, Photos: SUGISAKI, Kyoichi

Facilitator

NAGAOKA, Chikako

Project Assistant Professor, Research Center for Open Science and Data Platform, National Institute of Informatics

Microcredentials

Changing life courses and university education under pressure to transform

NAGAOKA: Going forward, universities will likely have to overcome various challenges as they promote DX. You specialize in higher education and online education, respectively. What kind of research and initiatives have you undertaken to date?

NODA: My specialty is higher education policy and international and comparative education. I received my doctorate in the U.S., and have since continued to conduct research on quality assurance and evaluation of higher education at universities and government-affiliated institutions both in Japan and overseas.

With the life model of “receiving education at a young age, followed by decades of work in a professional career” becoming less viable, the connection between education and work is growing increasingly important. Therefore, the establishment of a public qualification framework is essential. In recent years, I have been conducting research in this field, and am also involved in the design of the Japanese Educational Qualifications Framework.

HORI: I have been exploring the potential of online education from both a theoretical and practical perspective. My research focuses on learning economic models that apply blockchain technology to securely and reliably visualize learning histories, as well as the design and operation of micro-credentials, digital learning history certificates, and open badges.

Osaka Kyoiku University has developed and operates the online training system OZONE-EDU, which supports the reskilling of elementary and secondary school teachers and promotes transitioning to micro-credentials for board of education training. Additionally, through university collaboration, we are working to build a system that allows teacher training course

subjects and training results to be mutually converted into and shared as credits, thereby realizing the circulation of teacher training course credits.

NAGAOKA: In a nutshell, you’ve been involved in a wide range of initiatives involving online education and certification for learning outcomes in higher education settings, spanning theoretical research to practical implementation.

The new era of micro-credentials brought on by the COVID-19 pandemic

NAGAOKA: The concept of micro-credentials has been gaining global attention in the university education world, especially following the COVID-19 pandemic in 2020, and has continued to gain traction even after the pandemic.

NODA: According to global data from Google Trends, the term micro-credentials began appearing in search results around 2013. This is when massive open online courses (MOOCs) began to gain popularity. Interest in the term skyrocketed during the COVID-19 pandemic. With unemployment and skill gap issues becoming more serious, forcing countries to implement policies to promote reskilling, the concept started garnering attention as part of labor and employment policy.

Many developed countries are experiencing declining birthrates and aging populations, resulting in a decrease in the population of people around 20 years old. This means that from a management strategy perspective, universities need to attract more working adults. Traditional credentials such as degrees have been subdivided and dubbed micro-credentials. Short-term courses aimed at working adults have also been created, with the resulting learning certificates also being referred to as micro-credentials. Because degree programs are time-consuming and place considerable financial burdens on students, a growing need

has emerged for short-term, career-specific learning and flexible online learning. Due to governments and students alike sharing a common goal, micro-credentials have rapidly gained attention, and continue to do so to this day. Furthermore, in early 2020, just before the COVID-19 pandemic, the World Economic Forum launched the Reskilling Revolution initiative, further fueling interest.

NAGAOKA: What impact do you expect this to have?

NODA: The EU announced an agenda in 2020 with the primary objective of promoting employment and closing the skill gap.

To promote innovation and improve their graduate employment rates, universities sometimes encourage current students to take micro-credential courses. For example, graduate students may take micro-credentials on presentation skills or writing to shore up their weaknesses. Graduating with a digital badge certifying specific professional skills alongside a degree could increase their chances of finding a good job.

It could also serve as a second-chance support tool for people who have left the workforce due to family circumstances or other reasons, allowing them to pinpoint the necessary knowledge and skills they need to return to the workforce.

Of course, this is not limited to skill-based learning valued in the labor market. Students also have the option of accumulating micro-credentials, which break down academic learning into smaller modules, to earn a degree, although doing so may take time. Addressing a wide range of needs can also serve as an effective management strategy for universities.

NAGAOKA: Can a university refer to a course as a micro-credential regardless of the content?

NODA: No. Simply put, it’s about breaking down something that would be difficult to see in a macro



NODA, Ayaka

Received her PhD in education from the George Washington University in the U.S. Previously served as Lecturer at Ritsumeikan University, Associate Professor at the National Institution for Academic Degrees and Quality Enhancement of Higher Education, Visiting Scholar at the École des hautes études en sciences sociales (EHESS) in France, and Associate Professor at Tohoku University. She is currently involved in university accreditation evaluation and international quality assurance collaboration at the National Institution for Academic Degrees and Quality Enhancement of Higher Education. A Temporary Committee Member of the Lifelong Learning Committee under the Central Council for Education.

degree into smaller modules and making this visible.

To avoid an “anything goes” approach, we also need to define what a micro-credential is not. It can't be called a micro-credential unless it incorporates assessments to verify the knowledge and skills acquired, and the learning outcomes are properly visualized. For example, a simple certificate of attendance or participation is not a micro-credential. This is currently a topic of discussion worldwide.

NAGAOKA: What is the significance of university and academic research? It also helps provide an answer to that question.

NODA: In the U.S., where private universities dominate and tuition fees are extremely high, there is a tendency for students to question the significance of university education. More and more students are choosing to pursue courses that allow them to acquire skills in a shorter period of time, instead of full degrees. A similar trend is being seen in many developed countries to varying degrees. In many countries, it's becoming increasingly difficult for universities to sustain themselves by solely offering degree programs, the outcomes of which are difficult to immediately visualize.

Toward a future where “universities” are accessible to everyone, even those in the workplace

NAGAOKA: Japan faces a variety of challenges, both in terms of society and its universities. Could micro-credentials be the key to overcoming these challenges?

HORI: Current university education is inevitably geared toward young people around 18 years old.

Despite the fact that the knowledge and educational programs universities have cultivated could benefit a wider age range, there are currently insufficient access mechanisms and systems in place for people who want to go back to school after having entered the workforce. The potential of universities is only being utilized by current students, and has not yet fully reached working adults. I believe that micro-credentials hold the key to changing this situation. If universities were able to offer short-term online courses and issue digital certificates for these outcomes, working adults could acquire the skills they need at their own pace and use them to boost their careers. For universities, this would be a new way to give back the fruits of the students' learning to society and utilize their educational assets.

NAGAOKA: Are micro-credentials also attractive to the industrial sector?

HORI: Actually, in regions that house a large number of semiconductor companies, universities and companies are working together to jointly develop educational programs, which employees can take to obtain micro-credentials. These are then reflected in their internal evaluations and promotions. If such systems become more widespread, university education will function as a reskilling platform that is open not only to current students but to society as a whole. I feel that micro-credentials will truly serve as a bridge to reconnect universities and society.

NODA: The Japanese government is encouraging the creation of mi-

cro-credential courses in the context of regional revitalization and growth industries. There are also efforts in the industrial sector to encourage companies to reflect this in employee compensation and promotions. The disconnected relationship between universities and industry is likely to change dramatically. We may currently be in the transitional period before such an ecosystem is established and begins to circulate.

HORI: Universities also need to move beyond the traditional educational framework that assumes an 18-year-old population, and expand learning opportunities to a wider range of people, including working adults. In other words, they need to reevaluate the role of universities and transform into a system that gives back knowledge to society. However, this does not mean organizational expansion, such as increasing the number of faculties and departments, but rather a fundamental change in educational approaches and methods. It is important to understand the challenges faced by practitioners in the field and deliver the knowledge and skills required for each industry and occupation in a flexible format, like micro-credentials. The expertise and skill structure required in each domain differ, such as education, medical care, and government administration. This is why universities need to design learning models that are tailored to the characteristics of each field. While university transformation is no easy feat, I feel that we are steadily moving in a new direction.

NODA: Universities have resourc-

HORI, Masumi

Completed a master's degree at the Department of Information and Computer Sciences at the Faculty of Science, Nara Women's University. Engages in educational research as Chief Research Officer at NPO Consortium TIES' research institute and Project Professor at the Division of Math, Sciences, and Information Technology in Education, Osaka Kyoiku University. Her areas of expertise are web informatics, service informatics, and learning support systems. She also serves as the editor-in-chief of the Information Processing Society of Japan's (IPSJ) journal *Digital Practice* featuring IT and Education, and Steering Committee Member of IPSJ SIG Internet and Operation Technology.



es that can only be provided through the accumulation of knowledge and research. Initiatives to monetize these resources in collaboration with local companies are already underway. If the knowledge and skills gained from universities are made visible in the form of university-branded micro-credentials and digital badges, and the benefits are properly communicated, then society's perception of them should also change.

Expectations for NII regarding system infrastructure development

NAGAOKA: While there are many success stories, they remain isolated. This means that we need to systematize the nature of community-university interactions and the creation of packages suitable for micro-credentials.

HORI: I believe each university should be responsible for designing their own content, the quality of their online education, and demonstrating its uniqueness. However, the mechanisms for proving learning—for example, the format of certificates and digital badges—do not need to be unique to each university. I think it's important to establish common standards and make them interoperable across universities.

NAGAOKA: It would be a problem if the system was not standardized for both those who study and receive the certificate and the companies to which the certification is shown.

NODA: As learning is ultimately carried out by individuals, academic history and grades are personal information. Neutrality is expected from the institutions that

guarantee the quality of learning. I believe government involvement is necessary for digital badges, which provide proof of learning experiences, to be viewed more positively by Japanese society. Having badges issued and approved under the brand of a government-certified "university" is important as a sign of value and trust. Like Japan, many other Asian countries also place importance on government involvement. If the government was involved in micro-credentials at Japanese universities, they would serve as more trustworthy certifications for people looking to study abroad or seeking employment. To achieve this, quality assurance and information standardization are necessary. At the very least, digital badges must indicate the content and level of learning, the knowledge and skills acquired, the assessment method, and the number of hours (required to acquire the digital badge). The validity of the assessment must also be checked. The Japan Micro-Credentials Organization, a general incorporated association established on October 23, 2025, is currently working to create such rules.

NAGAOKA: It will likely be necessary to implement and operate these rules in an easy-to-use system, and to train the personnel required for system development.

HORI: If this becomes a reality, it will create the potential to provide Japanese micro-credentials overseas, sell Japanese university education overseas and earn foreign currency (laughs). The number of international students is also likely to increase. I think this will be an opportunity for Japanese universi-

ties, which have been focusing on the domestic population of 18-year-olds, to make a major shift and take a big leap forward.

NODA: Even now, there are students who, attracted to Japanese content, come from other countries to participate in summer programs at Japanese universities. I think there is great potential for providing educational content overseas via online learning. If quality assurance is in place, credit transfer with overseas universities will also become more common.

HORI: It may also change the school system itself. The current school system is based on a model established during the Industrial Revolution, where children are gathered at certain ages, taught the same content in groups, and sent out into the working world once their education is complete. This system has actually remained almost unchanged for nearly 200 years. If new learning systems like micro-credentials become more widespread, this very premise may need to be reconsidered.

NODA: If it becomes common knowledge that it's okay to study whenever you want and in any combination, then perhaps things like school absenteeism will no longer be an issue. As learning is undertaken by individuals, and they also own the outcomes of this learning, schools and universities are there to support them. This could be an opportunity to create such a world.

NAGAOKA: As an Inter-University Research Institute Corporation, I look for NII to contribute to helping change the way people learn.

NII NEWS TOPICS

Period: from **Sep. 1, 2025** (Mon.)
to **Oct. 31, 2025** (Fri.)

More details about news items are available online.
www.nii.ac.jp/news/2025
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News Releases

www.nii.ac.jp/news/release/

2025

Oct. 10 Research results from the CREST ZT-IoT project, which aims to realize secure Internet of Things (IoT) systems in accordance with the concept of zero trust by an integration of formal verification and system software technologies, presented at CEATEC 2025

Awards

www.nii.ac.jp/news/award/

2025

Oct. 28 Professor Atsuko Takefusa (Information Systems Architecture Sciences Research Division) received the 2025 IPSJ-CS Outstanding Achievement and Contribution Award

Oct. 27 A paper by Takanori Jin, Assistant Professor Taisuke Kobayashi and his team was awarded as the Advanced Robotics Excellent Paper Award at the 13th Advanced Robotics Paper Awards

Oct. 7 Associate Professor MIZUNO, Takayuki (Information and Society Research Division) won the Excellence Award in the social science category at the 24th DOCOMO Mobile Science Awards

Information on Regular Events

Cyber Symposium on Online Education and Digital Transformation at Universities and Other Educational Institutions

DX Symposium for Educational Institutions

The Research Organization of Information and Systems (ROIS) and National Institute of Informatics (NII) host the DX Symposium for Educational Institutions online once a month to share information on education DX at universities and other educational institutions.

The most recent symposium focused on the use of generative AI, with presentations covering practical topics such as its impact on university entrance exams, streamlining university administration through retrieval-augmented generation (RAG) systems, and its application to academic paper writing and research support systems. Various practical examples of DX promotion were also presented, including the introduction of micro-credentials for lifelong learning and teacher training course credit certification at teacher training universities, as featured in this issue, and remote international co-learning and educational content development using XR/metaverse technology.

The symposium is free of charge for all attendees (please check our website for upcoming events). Archives of past lectures are also available on the website below. We are also planning to upgrade to a search system using AI going forward.

DX Symposium for Educational Institutions (Japanese)

<https://www.nii.ac.jp/event/other/decs/>

DX Symposium for Educational Institutions Archives (Japanese)

<https://edx.nii.ac.jp/>



(Left) An image of the DX Symposium for Educational Institutions Archives. (Right) An example of a detailed page selected from the Archives (from the lecture given by Professor KITA, Hajime at the 90th symposium).

We Held Research Data Ecosystem Development Symposium 2025!!

On October 9 (Thu.) and 10 (Fri.), 2025, we held the DX Symposium for Educational Institutions 2025 (at the Hitotsubashi Hall medium conference room and online). This project, which began in fiscal 2022 and has now reached the halfway point, was held for the third time under the theme of “The Forefront of Various Forms of Knowledge Driven by AI and Data Infrastructure.” There were 170 in-person attendees, the largest number to date, and nearly 300 online attendees. The first day kicked off with an opening demonstration titled “Experiencing Our Research Data Ecosystem,” where more than 40 researchers from a wide range of fields introduced cutting-edge practices in research data. On the second day, in addition to an invited lecture by Guido Aben of SUNET (Sweden), the results of the core institutions involved in this project were introduced in concrete scenes from research sites.

Research Data Ecosystem Development Symposium website:
<https://rdes.rcos.nii.ac.jp/>



↑ A lecture by Guido Aben, a senior strategy officer at SUNET, the Swedish National Research and Education Network (NREN). He was also closely involved in the startup and execution of the CS3mesh4EOOSC project.

←The poster presentation venue. There were around 40 posters on display, covering various genres such as humanities, biotechnology and medical care, education, and the environment. Here, there was lively discussion and exchanges of opinions as the researchers gave their explanations.

What is the Research Data Ecosystem Development Project?

It is a large-scale project that started in 2022 after being selected for the Research Data Ecosystem-Building Project to Promote the Utilization of A.I., Etc. being implemented by the Ministry of Education, Culture, Sports, Science and Technology. Led by a core group of institutions consisting of NII, RIKEN, the University of Tokyo, Osaka University, and Nagoya University, in cooperation with local communities across Japan, the aim of the project is to build a platform for linking research data from different academic fields to further utilize data, transform research activities, and create interdisciplinary fields.

E s s a y

The Wave of Data Created by Academia and Industry

SEKIGUCHI, Satoshi

Senior Executive Officer/CTO, Information-technology Promotion Agency, Japan
Special Emeritus Advisor, National Institute of Advanced Industrial Science and Technology
Project Researcher, National Institute of Informatics

CEATEC 2025, held at Maku-hari Messe, was filled with excitement, with exhibits and discussions embodying “AI/DX for everything” under the theme of Innovation for All. While the application of AI is advancing across a wide range of fields, one key factor behind this is the ever-increasing importance of data. While on the surface, topics like generative AI and semiconductors have seemingly dominated discussions, data spaces and open data have once again come into the spotlight. I was reminded of the time 20 years ago, when I was involved in the NAREGI Project at NII, contemplating how to connect supercomputers, networks, and data. We all dreamed of being able to open up new knowledge, but at the time researchers could not freely move data back and forth. It means so much to me to see this idea evolve into the concept of “using data as a resource” and start to take center stage in industrial policy.

It's amid these developments that the Information-technology Promotion Agency, Japan (IPA) launched Open Data Spaces. It

is a project to unify various domestic initiatives under a common set of specifications and present them internationally in a unified manner. It is in line with the activities of the Ministry of Economy, Trade and Industry's Ouranos Ecosystem and the Japan Business Federation's Digital Ecosystem Public-Private Council, and preparations are also underway to establish a forum for the international dissemination of information. I would say that the enthusiasm of the industry and government has been strongly conveyed both in Japan and overseas.

Meanwhile, in academia, the promotion of open science has led to steady progress in ensuring the reproducibility of research results and disclosing data. However, the two sectors are yet to sufficiently come together. This is because, despite sharing fundamental elements such as metadata, ID, authentication, and access control, academia is premised on openness and sharing, while industry is premised on protection and competitiveness. It's a shame that there is such misalignment,

despite the existence of common technical elements.

This is where academic wisdom can be put to good use. The transparency and trustworthiness mechanisms that have been built up will be useful for industry in shaping data spaces and international rules. Conversely, industry's experience in international expansion and implementation will strengthen academic infrastructure. What is needed is an approach that makes greater use of academic ideas in industry and contributes to the formation of an ecosystem throughout Japan.

As a Project Researcher at NII and someone who has been involved in data and computing infrastructure for many years, my goal is to bridge outstanding academic achievements with industry and empower Japan as a whole. It's also important to have a somewhat festive spirit of getting everyone excited about data. If momentum to bridge academia, industry, and policy picks up steam, backed by the shared premise of viewing data as a resource, I think an even greater “data wave” will be born.