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NII Interview

NII's first 20 years and the future role of informatics

Supporting data-driven science and resolving social issues

KITSUREGAWA, Masaru [NII Director General]

History of the National Institute of Informatics (NII)

20th Anniversary Events Held Online

Commemorative ceremony, lectures, and forums livestreamed over two days.

Feature

20 Years of NII and What Lies Ahead

20th Anniversary Special Issue

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20th anniversary

NII's first 20 years and the future role of informatics

Supporting data-driven science and resolving social issues

KITSUREGAWA, Masaru Director General, National Institute of Informatics

Interviewer : TAKITA, Kyoko Deputy Director, Digital Media Bureau and General Manager, Online Division
The Yomiuri Shimbun (Tokyo Office)

This year, the National Institute of Informatics (NII) is celebrating its 20th anniversary. The NII is a unique research institution that pursues a wide variety of research, ranging from the fundamentals of informatics to practical research aimed at resolving real social issues. At the same time, it operates as an inter-university research institute to provide the cutting-edge information infrastructure needed for advanced research and educational activities. Since he took office in 2013, NII Director General KITSUREGAWA, Masaru has been working hard to build a foundation to prepare Japan for the challenges of digital transformation (DX). We asked him about the evolution of NII's role and its current activities, as well as the future role of informatics and NII's plans for the years ahead.

To fulfill its mission, NII is adding value to its SINET science network

—NII was established in 2000, taking over the role of its predecessor, the National Center for Science Information Systems (NACSIS), which was originally focused on library science, I believe.

KITSUREGAWA, Masaru

KITSUREGAWA:Everything started with the University of Tokyo's Research Center for Library and Information Science (RCLIS), set up in 1976. In those days, the power of a university was based on how many books it possessed. For example, the University of Tokyo had about 8 million books, compared to Kyoto University's 7 million. In that world, finding the information you needed was a very important task. That was the starting point.

When the UNIX operating system came out in the 1980s, it was bundled* with TCP/IP, which made it possible to connect computers via networks. It took time for networking to catch on, but it was eventually recognized as a vitally important infrastructure. Broadly speaking, NII has focused on the importance of two roles—managing information about knowledge (i.e., books) and networking to enable the distribution of information.

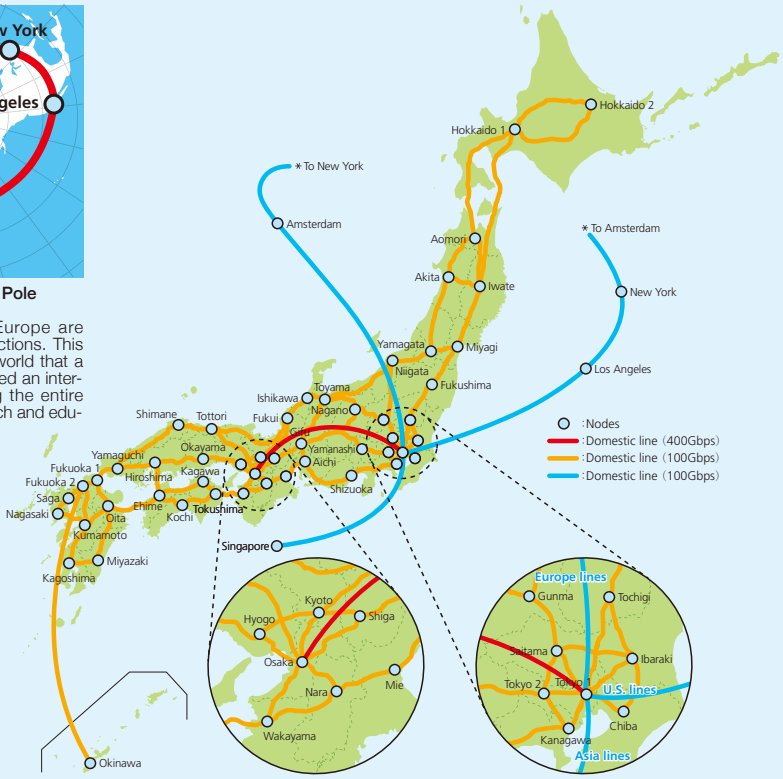
More specifically, the NII has worked on constructing and operating libraries and its Science Information Network (SINET). From INOSE, Hiroshi, who became the first NII Director General (DG) after leading NACSIS, to SUEMATSU Yasuharu and my predecessor SAKAUCHI, Masao, each successive NII DGs has done a great deal to develop and expand Japan's academic networks. So when I landed in my position seven years ago, I was thinking about the next level of network development.

—How did you see the NII when you took over as Director General?

KITSUREGAWA:Until I came here, I was a pure researcher at the University of Tokyo. I did very little managerial work. I guess I was viewed as someone who should be left to concentrate on research. However, NII DG SAKAUCHI asked me to consider doing research and serving as DG at the same time. He said that we needed leaders who could do both research and management. He himself had headed the Institute of Industrial Science at the University of Tokyo before joining NII, so he had moved from one management position to another. But I was coming to the job from

Bird's eye view of North Pole

Japan, the U.S., and Europe are joined by ring-like connections. This was the first time in the world that a single institution established an international network circling the entire globe as a national research and education network (NREN).



SINET5, constructed and operated by NII

SINET5 is an ultra-high-speed backbone network connecting universities and research institutes throughout Japan.
In addition to the 400-Gbps data line that joined Tokyo and Osaka in December of 2019, all domestic and international data lines boast a bandwidth of at least 100 Gbps. The network enables research involving massive volumes of data, such as large-scale collaborative international projects with overseas academic networks, as well as research and education through a variety of services.

a professorship role. I think they wanted me to change the image of the DG, by allowing me to continue my research while tackling the executive responsibilities of DG.

Quite honestly, I knew very little about inter-university research institutes or the NII initially. But I reasoned that if I didn't know anything about the NII, then neither did most other university professors. So whenever I gave a lecture, I would start by offering a brief introduction to the NII, mentioning that it was the provider of the SINET network. And when I met professors from various universities, I would explain that NII was an inter-university research institute that was working for them. "What would you like us to do for you?" I would ask.

At that time, their biggest concern was security. The sad reality, however, was that only a very small number of Japanese researchers were working on protection against cyberattacks.

When a house is robbed, people blame the robber. They don't blame the house for not being well protected. But if information is leaked from a university or research institute, or if someone hacks into a computer system, the general reaction is to blame lax security. Despite the fact that the victim is the party whose security is breached, people somehow reason that any organization that suffers a data breach is no good; they lose trust in the organization.A lot of people were asking us if we could do something to help improve security a little.

To begin, we needed to make SINET more robust, so we had to move beyond the conventional approach of just constructing and operating the network, to adding new functions and value to the network, so we could meet all the expectations of users. These were the kinds of thoughts that were rolling around in my mind in my early days at NII.

A foundation for supporting security research in Japan

—What exactly do you mean by adding value?

KITSUREGAWA:The SINET network currently connects about 950 universities and research institutes. This work is very important, of course, but users now take the connectivity of SINET for granted. Through our network infrastructure, we plan to offer users the services that they want. With an understanding that networks and network services will evolve in this way, I listened to what a variety of people had to say.

The first thing I tackled was security, as I mentioned already. We wanted to offer universities and research institutes protection 24 hours a day, 365 days a year. I tried to think of someone who could make that happen. There were plenty of security vendors selling their services, but private companies are cautious, so it's difficult to get detailed information from them. We decided that the only way to do the job properly was to do it ourselves.

Information about network intrusion patterns, viruses, malware, and the like is very valuable, but researchers do not have it. If we can't share such information with security researchers at universities and set up an environment that enables them to make use of it, then we won't be able to cultivate people capable of doing such research. I believe this problem is quite serious in the U.S., too.

So we recruited Prof. TAKAKURA, Hiroki to come over to work on security research at NII. Dr. TAKAKURA is now the director of our Center for Cybersecurity Research and Development. When I called on Dr. TAKAKURA to join NII, I suggested that he could help to protect the whole of Japan rather than just Nagoya University, where he was working. The SINET network is used all day every day, all over Japan, so detecting viruses, protecting the network, and acquiring useful knowledge for scientific research is no easy

task. Nevertheless, thanks to Dr. TAKAKURA's skill and hard work, we have improved our security service to a level comparable to that of commercial security services.

On the other hand, there is virtually no other country that boasts nationwide network connectivity at 100 Gbps. And Tokyo and Osaka are connected by a 400-Gbps line. In and of itself, protecting the security of this line was an exciting challenge. It's been about five years since Dr. TAKAKURA joined us, and now that the network is working so reliably, we are enjoying a high level of trust from universities.

By the end of 2020, we plan to finally share the security data we have collected to universities all over Japan. This will include data on security attack patterns, malware, etc., provided in a non-exploitable form.

Since NII is an inter-university research institute, we listen to what all universities have to say and work with them to decide the best course of action. On the question of budgets and funding, we enjoy the understanding and support of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), which allows us to work on developing systems step by step.

I hope to see more and more security research labs and departments at Japanese universities. We need engineering and science departments where specialist work on cybersecurity is a pillar of research. It is for this purpose that NII wants to supply security data, as well as to cultivate more security researchers.

Efforts to make cloud services easier to use

—Aside from security, what other kind of added value are you thinking about?

KITSUREGAWA:I think we need to support cloud services. NII does not provide its cloud services, however. The current director of NII's Center for Cloud Research and Development is Prof. AIDA, Kento. We tasked Dr. AIDA with comparing existing cloud services and presenting the findings to universities in an easy-to-understand way.

We saw the importance of cloud computing early on. When Amazon launched its cloud services, it was clear that the world was moving in that direction.

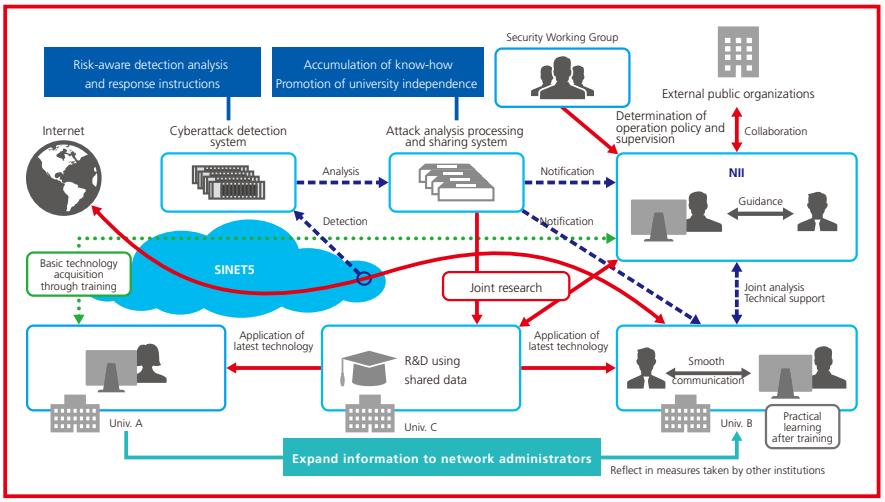
You can easily buy any computing device you like—just hand over the money—but operating it is the most difficult matter. Many things can happen to disrupt your experience. Network connections can drop for various reasons—power outages can occur, all kinds of things. Someone has to constantly watch over the network, which is a very costly process. In a few words, this is the essential value of the cloud.

Big companies can procure their own computers, but even if small and medium-sized enterprises can buy all their network hardware, they don't have the resources to take care of it. The same is true for educational institutions. Even when IT terminals are distributed to elementary and junior high schools, as they are under the government's current GIGA School Program, the question remains—What about the servers to connect them? It is difficult to know what and how to purchase server systems. Large universities may have the infrastructure and computing resources to support IT, but small universities, elementary schools, and junior high schools have little or nothing.

With cloud computing, on the other hand, there is no need for anyone to manage things. In this sense, the move to the cloud has been natural. Still, cloud specifications vary. For example, some services let you load data into the cloud for free but charge you for reading data. Business models are very complex, so people not well acquainted with computers and networking cannot understand service specifications.

This is why I constantly tell people to ask NII if they have any questions about cloud services. Instead of recommending specific vendors, we offer summaries of service features, with pros and cons. We even invite the cloud vendors to join us for cloud-related discussions. I believe that this approach leads to fair and healthy relationships. Holding study sessions where both vendors and users openly exchange information helps to create win-win relationships.

The prices of cloud services vary depending on factors like the frequency of use, the number of services, and the number of days contracted, but how they vary differs from one vendor to another. At one point in time, the price may be cheaper here, yet just two months later, the price will be lower somewhere else. Also, computing data loaded into one cloud may be difficult to migrate to another cloud. This is the so-called "lock-in" problem. From the vendor's viewpoint, it's more beneficial to keep data stored in their own cloud as much as possible. The Center for Cloud Research and Development is working on comparing cloud services and clearly rating them for how easy it is to migrate data out of the cloud. We regard this to be a key feature of any service.



NII established the Center for Cyber Security Research and Development in 2016 to support the establishment of a system to enable national university corporations and other organizations to respond rapidly to cyberattack and data security incidents and accidents. NII Security Operation Collaboration Services (NII-SOCS) has operated since 2017.

Building data infrastructure to support data-driven science

—How do you see SINET, NII's flagship project, evolving in the years ahead?

KITSUREGAWA:SINET5 has been operating since 2016, and SINET6 will be rolled out in 2022. SINET6 will be a more powerful version of SINET5, with 400-Gbps connections across

the whole network and a Terabit-class connection between Tokyo and Osaka.

There are also some big changes from the previous SINET implementation. We plan to build a data platform for utilizing research data. Europe is investing massively in its European Open Science Cloud (EOSC) initiative. The aim is to create an environment in which research results are stored on a data platform that enables researchers to freely share their data with each other.

We still don't have a model for such a data platform. Europe and the U.S. are already thinking hard about what it should look like, and Japan is not far behind them. NII is now setting out to build such a platform, under the leadership of Prof. YAMAJI, Kazutsuna of NII.

—Why is the world now moving to develop data infrastructure?

KITSUREGAWA:Let's talk about some of the major trends in science. Firstly, think of how we used to look up at the sky through a telescope to observe the motions of the planets. This is the science of observation.Next came the age of theoretical science, when equations were derived from the results of observations. Equations like those of Navier-Stokes for fluids and Maxwell for electromagnetism were created from theories.

Thirdly, we have computational science. Even if an equation can be formulated, you cannot fully understand the actual behavior described by the equation without performing numerical calculations. Often this requires huge amounts of computing power, which leads us into the era of supercomputers, or of computational science.

The next phase is data science, or data-driven science. It is a term that emerged around 2009 as the "fourth paradigm" after observation, theory, and calculation. Unlike physical phenomenon like electricity and fluid dynamics, which can be described by equations, complex systems like the human body and the global environment cannot be understood through equations. Thus, in a time when science must tackle illness and natural disasters, the focus of science is shifting away from calculations to data. This is what data-driven science means.

In 2012, a technology known as "deep learning" demonstrated excellent performance in image recognition. In the same year, the U.S. Obama administration launched its Big Data Research and Development Initiative. AI (artificial intelligence), which is today based principally on deep learning, needs to be fueled with massive quantities of data to make processes smarter. We are living in an era in which data and AI are inseparable. Both are essential for solving problems.

Striving for solutions to social challenges like medical care and disaster prevention

—I heard that informatics has been useful in diagnosing COVID-19 infections.

KITSUREGAWA:NII has been working with the Japan Radiological Society and other organizations on big data analysis of medical images, as part of a research project of the Japan Agency for Medical Research and Development (AMED). The medical support AI being aimed at here will not work without data. In the U.S., they say, "Data is the fuel of AI." Just as a car cannot run without the fuel of gasoline, AI, such as deep learning, cannot work without data.Or put another way, since AI learns by looking at data, it cannot do anything without data. The immense value of data is why we connected six medical societies with NII via SINET, for collecting medical image data.

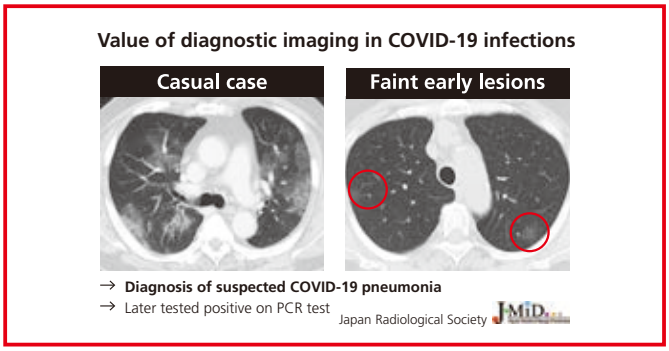
So far, NII's Research Center for Medical Bigdata has collected a total of around 200 million medical images, mostly CT images. It was this system that was recently used successfully for supporting COVID-19 diagnosis.

Around March, we started receiving CT images with possible indications of COVID-19-related pneumonia. To date we have collected images of approximately 700 cases of COVID-19-related pneumonia. Thanks to a system we created for sending CT images from university hospitals to NII's Research Center for Medical Bigdata via academic societies, we were able to rapidly develop an automatic AI-based system for diagnosis of COVID-19-related pneumonia. This is an open platform, with AI developed by the team of Prof. MORI, Kensaku at Nagoya University. NII is responsible for platform development and operation, as well as for annotation and for managing the various tools developed. The NII was convinced that a data platform would be important, and it was slowly collecting images. Now, however, we have verified that it is useful for real-world applications.

——How is data useful in the global environment field?

KITSUREGAWA:As everyone can sense, global warming is causing natural disasters to occur more frequently and with greater intensity. In the case of Japan, it is vital to collect reliable data to deal with floods, which occur frequently. At NII, Prof. KITAMOTO, Asanobu is involved in this research. Together with the University of Tokyo, we are working on the development of the Data Integration and Analysis System (DIAS) under the Program to Promote the Development of Earth Environmental Information Platform.

This July, torrential rains in Kumamoto Prefecture washed away many bridge girders and houses in the Kuma River valley, causing devastation. To try to prevent the recurrence of such a tragedy, we are currently developing an AI-based system that utilizes approximately 3,000 surveillance cameras installed along rivers all over Japan. We are beginning to develop an AI-based system that will use this collected big data so that the unique characteristics of the different rivers can be analyzed to determine when a particular river has reached a dangerous state.



The image on the left shows a case of asymptomatic COVID-19 pneumonia discovered casually. COVID-19 infection was suspected from the characteristics of the CT images and later confirmed by a PCR test. Although CT is a useful tool for diagnosing COVID-19, CT scans are sometimes inadequate for detecting lesions. Or else because the infection is still at an early stage, the lesions may be so faint that it is difficult for anyone but a specialist to identify them, as illustrated by the red-circle regions on the right. It is hoped that AI-based tools will soon be available to identify lesions like this that are too difficult for humans to find. (Images courtesy of AKASHI, Toshiaki, Associate Professor, Department of Radiology, Juntendo University School of Medicine)

——As science becomes more data-driven, will its basic nature change?

KITSUREGAWA:I think that the so-called "Lancet Gate" scandal that occurred in 2020 was very serious. In May, a paper was published in The Lancet, an international medical journal, expressing concerns about the safety of using antimalarial drugs to treat COVID-19 infections. However, in June, after doubts arose about the patient data on which the paper was based, the paper was retracted. Many papers on COVID-19 have been published without going through the time-consuming peer review process. This by itself is not necessarily a problem, and this kind of thing has happened during past emergency situations. However, when the authors of the retracted papers were asked for the data that they based their findings on, they were ultimately unable to give any satisfactory response.

In the age of data-driven science, it is important in the field of medicine and life sciences to properly manage any data, but especially if it is used as evidence. The most important element for the healthy progress of science in my view is to create a system that enables access to the data and information used at the time of the study, so things can be clarified when there is any doubt.

In some respects, communication between scientists is actually better expressed in data than in words. If you can show me the data that you used to write this paper, then it will be easier for us to talk about it. It is very important to create a foundation that allows researchers from different fields to look at and assimilate data properly. Such a foundation could open the way to new and better science.

Overcoming hurdles to social implementation and privacy protection

—We talked about NII's role in academia. However, as the whole of society becomes more digitalized, there is a lot of demand for the social implementation of informatics. I understand you are collaborating with the private sector on this.

KITSUREGAWA:Joint research with companies has often been done through so-called "endowed chairs." Since NII is an inter-university research institute, in the past the government basically wanted us to focus our effort on universities, but this approach has slowly shifted. Joint research with the private sector has become acceptable. We now actively promote industry-university collaborations.

In 2017, we entered into a joint research agreement with LINE Corporation, receiving about ¥100 million in research funding per year. Many universities engage in joint research with companies, but NII's special strength is that we have good relationships with IT professors at all of Japan's universities. For a company, trying to figure out which professor at which university to seek guidance from is a laborious and difficult task. At NII, we have a good understanding of which universities and which professors are good to work with in which field, so we can be quick and agile in putting together projects. With the support of LINE, NII is coordinating projects involving professors from various universities. We have tried to design a new framework for creating cross-university collaborative research initiatives in partnership with companies. This approach is unusual for an inter-university research institute, but this is the direction we are moving in.

—While many people enjoy the convenience of digitalization, they worry about how their personal information is treated. What are your thoughts on this issue?

KITSUREGAWA:With its General Data Protection Regulation (GDPR), the EU has rolled out a stringent system of protection for personal information. The other day, a professor from Karlsruhe Institute of Technology in Germany who was giving a lecture at an NII symposium on distance learning mentioned that he has to delete videos of student interviews immediately if requested by the student. So, they need to set up a system that allows them to respond to deletion requests, which means they need a detailed understanding of the software they are using.

The importance of personal information protection is slowly spreading. It's reaching the point where you cannot ignore it if you want to do any kind of business.

On the other hand, the current COVID-19 pandemic has made me think that if we could collect a certain amount of personal information for a limited emergency period, we could restart economic activities much, much faster. It might be good to ask how the public views this issue, asking, for example, "Would you consent to the use of your personal information under such and such circumstances?" I believe that having more detailed information can significantly help in limiting the spread of infection through technical means.

Thinking from scratch to pioneer the future

—What role do you think informatics researchers will play in the digital transformation of coming years? How do you envision the future?

KITSUREGAWA: I think the big lesson to be learned from our experience of responding to the COVID-19 pandemic is that we need to rethink everything from scratch. The question is how we can use our expertise and knowledge to benefit society.Speaking for myself, as the DG of NII, I thought about what we should do to keep education running. The IT world is inherently fast-paced. Environments and situations can change quickly and dramatically. That's why we are always trying to anticipate the future. This

March, we brought together people from universities and launched a conference series titled "Cyber-Symposium for Information Sharing on Remote Teaching Efforts at Universities since April." In the space of just one or two months, large national universities needed to convert approximately 5,000 classes to an online format. Students and teachers alike had only a very short time to learn a whole new way of teaching and learning.

National policy in recent times has been to encourage universities to compete with each other in producing research findings. This is a valid approach to a point, but it becomes inefficient when unity is needed to address a major crisis like the COVID-19 pandemic. NII is an inter-university research institute; so quite naturally, the first thing we did to respond was to call on the seven former imperial universities. We knew that we would make plenty of mistakes because we were trying something totally new, but we decided to push ahead with the transition to distance learning, openly sharing all our mistakes and missteps with each other and then gradually sharing our accumulated experience and knowledge with other universities. Thanks to this strategy, we were able to ensure that Japanese universities could implement reliable, efficient distance learning, on a par with leading universities overseas. The universities were very pleased. For example, I just received this message from a professor: "Thank you very much for your great help in April and May. As an expression of appreciation, here is an update of our current activities."

Each researcher has to move forward step by step, reflecting on what society wants. I believe that even as we each need to think concretely about what to investigate, we can transform Japan by helping to foster bold students and by taking on new research challenges.

Photography by SATO, Yusuke

A Word from the Interviewer

The emergence of data-intensive science as "the fourth paradigm" is greatly expanding the scope of NII's projects and research. It is reassuring to see how knowledge of informatics is helping to solve problems in the fields of medicine and disaster prevention by enabling the analysis of massive volumes of data. How will the accumulated findings of basic research help us to respond to the needs of society? Since its beginnings in the field of library science, NII has been supporting the academic infrastructure of Japan, adapting steadily through the changings times. I look forward to seeing what kind of services it will be offering in the years ahead, as it embraces the open science movement.

TAKITA, Kyoko

Deputy Director, Digital Media Bureau and General Manager, Online Division, The Yomiuri Shimbun
After graduating from Faculty of Foreign Studies, Sophia University in 1989, joined the Yomiuri Shimbun. After completing a graduate program at the University of California Berkeley Graduate School of Journalism in 2000, in 2002 joined the company's Science Division, working in the areas of science and technology policy, IT, space development, and disasters. Assumed current positions in 2020 after working as an editorial writer, heading the Science Division, and serving as Deputy Editor of the Media Bureau.

20 Years of NII

Time		Description
1976	May	The University of Tokyo Research Center for Library and Information Science (RCLIS) is established.
1978	Nov.	The Minister of Education, Science, Sports and Culture consults the Science Council of Japan about "Future Directions in Science Information Systems." The council reports back in January 1980.
1983	April	The University of Tokyo Center for Bibliographic Information (CBI) is established (reorganization of RCLIS)
1984	Dec.	A catalog information service (NACSIS-CAT) is launched
1986	April	National Center for Science Information Systems (NACSIS) is established (reorganization of the University of Tokyo CBI).
1987	April	• Science Information Network (SINET) begins operation along with information search service. • Information search service (NACSIS-IR) is launched.
1988	April	E-mail service is launched.
1989	Jan.	International connection of science information network with the U.S. (National Science Foundation: NSF)
1990	Jan.	International connection of science information network with the U.K. (British Library: BL)
1992	April	• Inter-Library Loan (ILL) system is launched. • Internet backbone (SINET) begins operation.
1993	Nov.	Gateway with Japan Information Center of Science and Technology (JICST) enables database interavailability.
1994	April	ILL connection service with British Library Document Supply Center (BLDSC) is launched.
	Nov.	Construction of NII Chiba Annex (Chiba City, Chiba Prefecture) is completed.
1995	Oct.	International connection of science information network with Thailand
1996	April	ILL connection service with National Diet Library begins.
1997	March	Construction of International Seminar House for Advanced Studies (Karuizawa, Nagano Prefecture) is completed.
	April	Electronic library service is launched.
1998	Jan.	The Science Council of Japan proposes establishment of core research institute for information research (as an inter-university research institute) as part of its "Policy for Promotion of Information Science."
2000	Feb.	NACSIS relocates to the National Center of Sciences Building (Hitotsubashi, Chiyoda-ku, Tokyo).
	April	National Institute of Informatics is established (replacement/reorganization of NACSIS).
2002	Jan.	Super SINET begins operation.
	April	• Department of Informatics is set up at Graduate University for Advanced Studies (SOKENDAI). • GeNii (NII Scholarly and Academic Information Portal) is launched. • Japan-U.S. document delivery service begins operation.
	June	Catalog system link to U.S. RLG opens.
	Sept.	Research Planning and Promotion Strategy Office is established
	Oct.	• International post-graduate program (Department of Informatics) is launched at SOKENDAI. • Joint project for the construction of a metadata database is launched.
2003	Jan.	Global Liaison Office is opened.
	April	Office for Promotion of International Academic Information Distribution Infrastructure is established.
2004	April	National Institute of Informatics (Inter-University Research Institute Corporation / Research Organization of Information and Systems) is established.
2005	April	GeNii (NII Scholarly and Academic Information Portal) begins official operation.
2007	June	Science Information Network SINET3 begins full-scale operation.
2009	April	CiNii (NII Scholarly and Academic Information Navigator) and KAKEN (database of grants-in-aid for scientific research) are renewed and Japanese Institutional Repositories Online (JAIRO) portal is officially launched.
2011	Feb.	First NII Shonan Conference is held.
	April	• Science Information Network SINET4 begins full-scale operation. • Library Liaison Office is established.
	Nov.	CiNii Books is officially launched.
2012	April	JAIRO Cloud (shared repository service) begins operation.
2015	Oct.	CiNii Dissertations is officially launched.
2016	April	Science Information Network SINET5 begins full-scale operation.

History of the National Institute of Informatics (NII)

1976 to 2000

The beginnings of the National Institute of Informatics' (NII) predecessor, the National Center for Science Information Systems (NACSIS), can be traced back to April 1983, when the Center for Bibliographic Information (CBI) was established at the University of Tokyo, and even further back to May 1976, with the launch of the Research Center for Library and Information Science (RCLIS) at the same university. Here is an outline of the history of the NII up to the time of its establishment (April 1976 to April 2000).

An organ of the University of Tokyo

1976 May

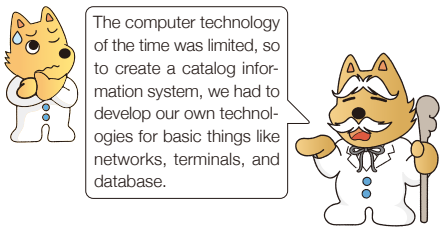
The University of Tokyo Research Center for Library and Information Science (RCLIS)
(set up as a joint-use facility on the University of Tokyo campus)

As well as promoting wide-ranging research in library and information science, the RCLIS engaged in technological development and education and training related to this field. The RCLIS was responsible for editing the Union Catalog of Academic Journals, a centralized record of academic journals in European languages held by university libraries throughout Japan, taking over the role from the (then) Ministry of Education, Science, Sports and Culture. To enable more advanced, computerized cataloguing and editing, it adopted mini-computers that were state-of-the-art for their time. In 1980, it produced a database version of the catalog for distribution to libraries on magnetic tape. Later, it released an online search system, TOOL-ULP. Initially, only roman text searches were possible.

1983 April

The University of Tokyo Center for Bibliographic Information (CBI)
(reorganized/repurposed)

The University of Tokyo Center for Bibliographic Information was created as a successor to the Research Center for Library and Information Science, taking over the function of editing the Union Catalog of Academic Journals, as well as tackling R&D focused on a new catalog information system.



1984 April

Now a national joint-use facility

In 1984, the Center for Bibliographic Information leased a small space on the University of Tsukuba's Otsuka campus to begin its operations. Due to a lack of space, a 2-story prefabricated building was erected here. At the same time, the CBI leased the herbarium of the Koishikawa Botanical Garden belonging to the University of Tokyo's School of Science (a designated Important Cultural Property, formerly the main building of the Tokyo Medical School, now the Koishikawa Annex of the University of Tokyo's The University Museum).

Bldg. E on University of Tsukuba's Otsuka campus and the temporary building in the courtyard

Using the herbarium of the University of Tokyo's Koishikawa Botanical Garden

NII's Chiba Annex

1986 April

National Center for Science Information Systems
(Inter-University Research Institute)
(reorganized/repurposed)

International Seminar House for Advanced Studies

An organ of the Ministry of Education, Science, Sports and Culture (now MEXT)

1989 April

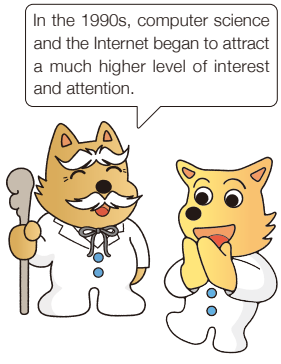
Center for Science Information Systems (Inter-University Research Institute)
(revised in accordance with amendment of law)

The first science information network provided by the National Center for Science Information Systems was a packet-switched network (X.25) launched in January 1987 for connecting the computer centers of multiple universities and facilitating catalog information services. In April 1992, a TCP/IP-based Internet backbone (SINET) also began operation.

1999 Dec.

Relocation to floors 13 to 22 of the National Center of Sciences Building (23 floors above ground, 2 below), completed in December 1999. (Later, 12th floor was also used.) * Relocation was made in February 2000.

National Center of Sciences Building



2000 April

The National Institute of Informatics (NII) is established.

2000 to 2020

This page outlines the history of the National Institute of Informatics (NII) since its establishment (April 2000 to December 2020). For further details, refer to the booklet "20 Years of the National Institute of Informatics" (in Japanese) published to commemorate the 20th anniversary of NII's founding at https://www.nii.ac.jp/20th/publication/pdf/nii20th.pdf).

About the organization

About SINET

Part of the Ministry of Education, Culture, Sports, Science and Technology (from 2001)

National Institute of Informatics (NII) (Inter-University Research Institute)

1st Medium-term Target Medium-term Plan

2nd Medium-term Target Medium-term Plan

3rd Medium-term Target Medium-term Plan

2000 April — **National Institute of Informatics (NII) is established as an Inter-University Research Institute by the Ministry of Education, Culture, Sports, Science and Technology (MEXT)**

When NII was established, it was organized according to seven areas of research (Basic Informatics, Information Infrastructure, Software, Information Media, Intelligent Systems, Human and Social Information, and Academic Research Information), and two research facilities (the Center for Empirical Research and the Center for Informatics Resources).

2001

2002 April — **The Department of Informatics of the Graduate University for Advanced Studies (SOKENDAI) is established at NII.**

Operation of Super SINET, at 10 Gbps the world's fastest science information network, began in January 2002.

2003

By 2003, the number of universities and other institutions subscribing to SINET had grown to 745, while NACSIS-CAT had a total of 1,026 participating libraries, with 70.8 million catalog records, and 1.1 million inter-library loans per year via NACSIS-ILL.

2004 April — **Following legal reforms that made national universities independent administrative institutions, Japan's inter-university research institutes were reorganized into four Inter-University Research Institute Corporations. As a result, NII was grouped with three other institutes—the National Institute of Polar Research, the Institute of Statistical Mathematics, and the National Institute of Genetics"—under one of these four corporations—the Research Organization of Information and Systems (ROIS).**

2005

In 2006, NII's seven research fields were simplified to four research divisions: Principles of Informatics, Information Systems Architecture, Digital Content and Media Sciences, and Information and Society. The center was also reorganized and expanded.

2006

2007

SINET3, featuring optical IP hybrid technology and 40-Gbps backbone lines, begins full-scale operation (June 2007).

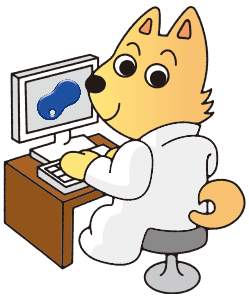
2008

In addition to the NACSIS-CAT cataloging information service (launched April 1985), NII has continued to offer and develop numerous other science information services since its launch.
· NII Scholarly and Academic Information Portal (GeNii) with integrated search is officially launched (April 2005).
· Inter-university authentication and authorization infrastructure (UPKI) initiative is launched (Aug. 2005).
· Japanese Institutional Repositories Online (JAIRO) portal is officially opened (April 2009), etc.

2009

2010 April

SINET4, featuring a 40-Gbps loop configuration begins full-scale operation (April 2011).



2011

2012

2013

2014

On top of existing services, NII began operating an "Academic Access Management Federation" (GakuNin) in 2014 as well as its UPKI service for issuing digital certificates in 2015. In April 2016, its NACSIS-CAT university library catalog service had grown to serve 1,337 participating institutions, with 137 million catalog records and 460,000 copies per year made via the NACSIS-ILL inter-library loan system.

SINET5, linking the whole of Japan at 100 Gbps, begins full-scale operation (April 2016).

NII's international lines with ring connections extending from Japan to the U.S. and Europe and back have developed into an ultra-high-speed network that encircles the globe at 100 Gbps.

2015

2016 April

2017

NII and the University of Tokyo set out to construct a new facility on University of Tokyo's Kashiwa II Campus (construction Feb. 2019 to Aug. 2020), to be used for R&D and business development.

NII's Kashiwa Annex

NII is offering more and more science information services and setting up a growing number of R&D and business centers.

2018

2019

Now (2020 Dec.) — **NII celebrates the 20th anniversary of its establishment.**

As of 2020, NII employed a total of 139 full-time staff—75 academics and 64 administrators—as well as 46 specially appointed professors and 262 fixed-term contract employees.

National Institute of Informatics (NII) 20th Anniversary Events Held Online

Commemorative ceremony, lectures, and forums were livestreamed over two days.

This year marks the 20th anniversary of the establishment of the National Institute of Informatics (NII) in April 2000. To celebrate the anniversary, the NII held a commemorative ceremony and lectures on December 3, as well as commemorative forums on December 4, all streamed live over the Internet on YouTube Live and LINE LIVE. Videos and materials of the ceremony, lectures, and forums are available at the following page. https://www.nii.ac.jp/event/2020/1203.html

Commemorative Ceremony and Lectures December 3, 2020

The commemorative ceremony on December 3 began with opening remarks by NII Director General KITSUREGAWA, Masaru and FUJII, Ryoichi, President of Research Organization of Information and Systems. Next, SUGINO, Tsuyoshi, Director General of the Research Promotion Bureau (MEXT), NISHIO, Shojiro, President of Osaka University, YAMAUCHI, Masanori, Director General of the High Energy Accelerator Research Organization (KEK), and FUKAZAWA, Yoshiaki, Chair of the Academic eXchange for Information Environment and Strategy (formerly Library Director and Professor in the Faculty of Science and Engineering at Waseda University), gave congratulatory addresses.

The ceremony was followed with a commemorative lecture by UEYAMA, Takahiro, a full-time member of the Council for Science, Technology and Innovation, titled “Questioning Science, Technology and Innovation Policy in the Post-COVID Era.” The lecture dealt with the directions of the Society 5.0 concept and the outlook for the 6th Science and Technology Basic Plan. Next up, SAWADA, Jun, President & CEO of Nippon Telegraph and Telephone Corporation (NTT), delivered a lecture titled “Thinking About the Future of Society.” He discussed the concept of the Innovative Optical and Wireless Network (IOWN), a vision of an innovative optical technology-based network and information processing infrastructure that NTT is working (with partners) to realize by 2030. At the end of the lecture, he and NII Director General KITSUREGAWA engaged in a conversation.

In the second half of the program, there was a panel discussion entitled, “At the Height of the COVID-19 Pandemic, What is Digital and What Should NII’s Future Role Be?” The invited panelists were Dr.UEYAMA; SHIBUTANI, Naoki, Senior Executive Vice President of NTT; KATSU, Eijiro, President of Internet Initiative Japan (IIJ); TAKAHASHI, Makoto, President of KDDI; and IDEZAWA, Takeshi, CEO of LINE. Director General KITSUREGAWA moderated the discussion. The panelists exchanged views on how COVID-19 has changed society, the role played by digital technology, and what is expected of NII.

Finally, as a special lecture, GONOKAMI, Makoto, President of The University of Tokyo, spoke on the topic of “Expectations of NII for the Realization of Society 5.0.” Dr. GONOKAMI spoke of his high expectations for SINET, the science information network constructed and operated by NII, describing it as a core infrastructure for supporting the data-driven society of the future and realizing the vision of Society 5.0.

Starting on the next page, we offer more detailed accounts of the congratulatory messages, lectures, and forums held as part of the commemorative ceremony.

Words of encouragement for a 20-year-old NII

NII started out organizing and systematizing library information. Gradually, however, we decided that we should also enhance SINET, the science information network that served as a platform for distributing information. In recent years, we have been developing a slew of new services, relating to network security, cloud computing, and other areas. In 2022, we will start rolling out data infrastructure services. With the creation of the national Digital Agency in 2021, our next big challenge is applying DX (digital transformation) to the whole of the academic space. Under its GIGA School Program this year, the government is providing one digital terminal for every elementary and junior high school student in the country, so we are thinking about how SINET can help with this. Now that NII has come of age, we hope that you will all continue to encourage and inspire us.

KITSUREGAWA, Masaru
Director General, NII

Three key roles, expectations for further development

As an inter-university research institute, the NII plays three important roles. The first is to serve as a base for comprehensive research in informatics, which is now fundamental to development in all academic fields and becoming more essential all the time. The second role is to serve as a base for the development and operation of advanced information infrastructure.

SINET is a vital infrastructure for educational and research institutions all over Japan. NII’s work to develop an information security system and offer related security services is a major contribution to these institutions. The development and operation of a research data infrastructure system is another important need in many academic fields. We have high hopes that NII will deliver on this too before long. NII’s third role is to serve as a base for social collaboration with industry and other sectors. As the need for informatics continues to increase in the society, I hope that NII also strengthens and expands joint industry-academia-government initiatives.

FUJII, Ryoichi
President, Research Organization of Information and Systems (Inter-University Research Institute Corporation)

Congratulatory speeches by guests (in order of delivery)

Promoting data utilization in data-driven research and education

Since it was established, NII has pursued informatics research and projects like its SINET science information network as inseparable parts of its mission. Amid the turmoil of the COVID-19 pandemic, NII was quick to provide support to enable universities and other institutions to continue delivering their educational programs. Many people in the education, as well as the education ministry (MEXT), have expressed their gratitude for NII's efforts. The activities of NII are a vital foundation for all fields of research and education. To address the challenges of the COVID-19 world and the post-pandemic future, MEXT is promoting digital transformation as one of its major policies. Important challenges include the promotion of data-driven research and the use of data in education. We expect to see NII leading the way and providing support on these issues.

SUGINO, Tsuyoshi
Director General, Research Promotion Bureau (MEXT)

Deeper collaboration with NII to overcome COVID-19 era difficulties

I remember seeing the National Center of Sciences Building when it was under construction just before 2000. I was excited to learn that it would contain a research institute for information systems. In the 20 years since then, NII has achieved unprecedented growth under the leadership of successive director generals. The importance of SINET5, which links all of Japan with 100-Gbps high-speed data lines, and of institutional repositories, has grown with the evolution of open science. NII has been a driving force in the field informatics, consistent with the principle of "creating future value through informatics." Many years ago, Director General KITSUREGAWA was a leading specialist in a field of research known as "Information Explosion" (Grant-in-Aid for Scientific Research on Priority Areas), foreseeing the advent of the "big data" era long before the rest of the world. These research insights took root in the university and led to the cultivation of many talented young researchers. During this COVID-19 pandemic, NII has worked on solving the problems of online education. It is time for all universities to cooperate more deeply with NII to help build a new academic information infrastructure for overcoming the difficulties of these pandemic-afflicted times.

NISHIO, Shojiro
President, Osaka University

SINET, a high-speed network to support large-scale research

The High Energy Accelerator Research Organization (KEK) is an inter-university research institute that conducts research on elementary particles and their physical properties using particle accelerators. Over 3,000 researchers from all over the world participate in our research, sharing computer resources from many different countries to analyze massive quantities of experimental data. For this work, our most precious resource is the high-speed SINET network provided by NII, which connects all these researchers together. SINET has supported Nobel Prize-winning research. Research projects in our field can be huge in scale, involving many researchers coming and going from all over the world. However, the COVID-19 pandemic is forcing us to seek "new research models"—utilizing virtual reality, for example—on which we hope to obtain the cooperation of NII. On this 20th anniversary, I would like to express my hope that NII will continue to grow and flourish as a leader of Japan's academic research infrastructure and as an international center for informatics.

YAMAUCHI, Masanori
Director General, High Energy Accelerator Research Organization(KEK)

Hoping to continue developing IT environments together

Whenever I am in a university library, I feel appreciation for the great work of NII. Its NACSIS-CAT, Japan's largest bibliographic database, and JAIRO Cloud, a shared repository service, are essential elements of the infrastructure of university libraries. NII is also making a major contribution to the open science movement. Its "Cyber-Symposium for Information Sharing on Remote Teaching Efforts at Universities since April" initiative, launched soon after the onset of the COVID-19 pandemic, turned out to be truly three-dimensional in terms of the diversity of contents, the number of countries involved, and its broad scope, covering elementary and secondary education, as well as higher education. It was a valuable support resource that helped many institutions maintain the continuity of their educational programs. As chair of the Academic eXchange for Information Environment and Strategy, I hope to continue working hand in hand with NII to develop better IT environments in Japan, particularly for institutions of higher education.

FUKAZAWA, Yoshiaki
Chair, Academic eXchange for Information Environment and Strategy (formerly Library Director and Professor in the Faculty of Science and Engineering at Waseda University)

NII 20th Anniversary Commemorative Ceremony

Program December 3 (Thu)

Moderator
ADACHI, Jun
[Vice Director General, NII]

Commemorative Ceremony

Greeting
KITSUREGAWA, Masaru
[Director General, NII]

Greeting
FUJII, Ryoichi
[President, Research Organization of Information and Systems]

Congratulatory address by guest
SUGINO, Tsuyoshi
[Director General, Research Promotion Bureau (MEXT)]

Congratulatory address by guest
NISHIO, Shojiro
[President, Osaka University]

Congratulatory address by guest
YAMAUCHI, Masanori
[Director General, High Energy Accelerator Research Organization (KEK)]

Congratulatory address by guest
FUKAZAWA, Yoshiaki
[Academic eXchange for Information Environment and Strategy (formerly Library Director and Professor in the Faculty of Science and Engineering at Waseda University)]

Commemorative lectures

Lecture 1
"Questioning Science, Technology and Innovation Policy in the Post-COVID Era"
UEYAMA, Takahiro
[Full-time Member, Council for Science, Technology and Innovation]

Lecture 2
"Thinking About the Future of Society"
SAWADA, Jun
[President & CEO, NTT]

Panel discussion
"At the Height of the COVID-19 Pandemic, What is Digital and What Should NII's Future Role Be?"
UEYAMA, Takahiro
[Full-time Member, Council for Science, Technology and Innovation]
SHIBUTANI, Naoki
[Senior Executive Vice President, NTT]
KATSU, Eijiro
[President, Internet Initiative Japan (IIJ)]
TAKAHASHI, Makoto
[President, KDDI]
IDEZAWA, Takeshi
[CEO, LINE]
KITSUREGAWA, Masaru
[Director General, NII]

Special lecture
"Expectations of NII for the Realization of Society 5.0."
GONOKAMI, Makoto
[President, The University of Tokyo]

Acknowledgements
KITSUREGAWA, Masaru
(Director General, NII)

Close

Commemorative Lecture 1

"Questioning Science, Technology and Innovation Policy in the Post-COVID Era"

All over the world, more and more people are looking to science and technology for a solution to the COVID-19 pandemic. In this context, Dr. UEYAMA of the Cabinet Office talked about the 6th Science and Technology Basic Plan, which defines Japan's science and technology policy from 2021, touching on some of the information-related issues currently under discussion.

Under the concept of "Society 5.0," the previous 5th plan promoted policies aimed at shaping a "human-centered ultra-smart society," even delving into social life. However, the remote living and working forced on us by COVID-19 has exposed our lack of digitalization. To address this issue, the 6th plan has been modified significantly. Dr. UEYAMA explained the background to this change, asserting that the COVID-19 pandemic will significantly alter the political and economic order in the coming years. He also pointed out that the delay in shaping an ultra-smart society is not a problem of digital R&D; it has to do with the structure of the whole social system. Furthermore, citing the findings of a questionnaire survey, he suggested that science and technology will increasingly rely on "clear value creation" and "personal viewpoints," and that such perspectives will be incorporated into the 6th plan.

UEYAMA, Takahiro

Full-time Member, Council for Science, Technology and Innovation

Commemorative Lecture 2

Thinking about the future of society

The "IOWN" concept proposed by NTT is a network and information processing infrastructure based on innovate optical technologies and capable of ultra-powerful computing resources, aimed at high-speed, high-capacity communications that far surpass the limits of any previous infrastructure.NTT President & CEO SAWADA explained that IOWN encompasses three major technology areas (All-Photonics Networks, Digital Twin Computing, and Cognitive Foundation). He said, "To support the vast amount of information processing in cyberspace, we need to provide computers and computing environments that offer higher capacity and lower latency communications, as well as greater energy efficiency and higher speed. On top of this, we also need a cognitive software foundation to connect computing environments together."

Continuing to describe his vision of the future, he said, "We want to collaborate with NII and other partners on creating computer systems for designing future cities, optimizing human and traffic flow control, and making medical care smarter. Our aim is to realize all this by around 2030." Finally, Dr. UEYAMA and Dr. KITSUREGAWA conversed for some time, exchanging opinions about the IOWN vision and what needs to be done to make it a reality.

SAWADA, Jun

President & CEO, NTT

Panel discussion

At the Height of the COVID-19 Pandemic, What is Digital and What Should NII's Future Role Be?

The five invited panelists are all key players in the fields of science and technology policy and IoT. In this discussion, moderated by Dr. KITSUREGAWA, they expressed their views on the slow pace of Japan's digitalization, which the COVID-19 pandemic has exposed.

First, Dr. KITSUREGAWA raised the issue of the inability of Japan's R&D efforts to respond with agility in times of emergency. Dr. UEYAMA of the Cabinet Office replied by pointing out a systemic problem. In the past, Japanese universities were able to use the funds they received flexibly, so they could invest them where they were most needed. But this is not the case with competitive grants. He also suggested that changing the way research findings are evaluated could lead to greater flexibility in the use of funds. For example, even if a research project appears to be a failure, there may be value in supplying the data it produced to other researchers. Dr. KITSUREGAWA replied to say that the culture of data sharing has not taken root in Japan. He sees a need to promote the view that data belongs to everyone and that the focus of competition should be on creating value from data.

To a question about the potential benefits of a system for sharing research data, Dr. TAKAHASHI of KDDI explained that in the advertising world, various kinds of data are used to help tailor information to the interests of customers. Combining research data would be sure to generate new value.

The next topic was the disparity between universities in computing resources for online classes. Dr. SHIBUTANI of NTT outlined his company's initiatives, saying that the key to promoting DX is to focus on supporting the people who actually use IT. On the need for a domestically produced cloud platform, Dr. KATSU of IIJ explained that a domestic cloud platform could never be produced without government collaboration. On the other hand, Dr. IDEZAWA of LINE revealed that LINE has aimed at creating interfaces that are easy enough for anyone to use, and that through the COVID-19 pandemic, the company realized that it can offer a variety of services, including medical care, via its mobile apps.

Dr. KITSUREGAWA concluded by mentioning that he recently met a student who listens to recorded lectures at double speed and participates in overseas-based MOOCs to learn in his/her spare time. This was an example of a resilient person who sees the COVID-19 pandemic as an opportunity. "Will Japan use this pandemic as an opportunity for digital transformation?" asked Dr. KITSUREGAWA. The panel discussion ended on a note of consensus, that to realize this goal it is important to cooperate and help shape a culture in Japan that permits failure and risks.

KITSUREGAWA, Masaru

UEYAMA, Takahiro

SHIBUTANI, Naoki

KATSU, Eijiro

TAKAHASHI, Makoto

IDEZAWA, Takeshi

Panelists discussing how COVID-19 pandemic has changed society, the role of digital technology, and expectations of NII.

Special lecture Expectations of NII for the Realization of Society 5.0

SINET5, the science information network constructed and operated by NII, is an information and communications network used by universities and research institutes throughout Japan. All domestic and international network nodes are connected by ultra-high-speed data lines of 100 Gbps or more. President of The University of Tokyo GONOKAMI highlighted the network's importance, seeing SINET as a core resource for making Japan a "smart" society. He said, "In this transition to a knowledge-intensive society, this high-quality network plays a role comparable to the roads and ports in industrialized societies. It is a vital piece of industrial and social infrastructure." He added that for a data-driven society, it is vital not just to have a communications network, but also to properly share the data that moves over the network, explaining that NII and universities are collaborating to build a platform for sharing high-quality data. Dr. GONOKAMI also touched on the Smart Islands Initiative, which aims at constructing an advanced digital neural network nationwide by connecting SINET with GIGA schools. He concluded his talk by expressing his hopes for the further flourishing of NII, saying, "I believe that we can leverage SINET's strengths as a high-spec network, using universities across the country as starting points to help us in shaping a knowledge-intensive society. In this sense, the NII is likely to play an even more important role in the future."

GONOKAMI, Makoto
President, The University of Tokyo

Commemorative Forum December 4, 2020

Commemorative Forum December 4, 2020
The commemorative forum on December 4 consisted of five sessions on the following themes: "Expectations of the Next SINET from the Perspective of Education and Research—Online Education, GIGA Schools, and Society 5.0"; "Data Sharing from the Perspectives of Nation, Academia, and Private Sector"; "Medical Big Data- Infrastructure for Storage and Analysis of Medical Image Data"; "What University Libraries Expect from NII After the Pandemic," and "CRIS—Robust Knowledge Infrastructure and Problem-Solving Technology."
These sessions offered outlines of noteworthy projects and research that NII (as an inter-university research institute) is working on in partnership with other universities and organizations. The sessions also delved into how NII can develop its current services and research further, what the future holds for NII and SINET, and what their role should be.
This series of commemorative events held over two days was viewed by approximately 5,500 people on YouTube and LINE LIVE. Holding the event online enabled people from all over Japan to participate. Transcending the limitations of distance, these events offered many people the opportunity to learn about NII's research and projects for the first time.

Session 1 Expectations of the Next SINET from the Perspective of Education and Research—Online Education, GIGA Schools, and Society 5.0

In this session, we invited people involved in higher education and elementary and secondary education, as well as IT vendors that support online education, to discuss the concept behind the GIGA School Program, online education, and the next-generation academic information infrastructure needed to promote Society 5.0. The question of what to expect from the next iteration of SINET was also touched on.

Session 2 Data Sharing from the Perspectives of Nation, Academia, and Private Sector

The notion of data sharing in the context of open science is deeply connected to scientific development, as well as to the basic principles of national and private-sector data strategies. The panelists took a "big picture" view of the data sharing initiatives they are promoting from the perspective of "data governance," for a discussion focused on a future vision of the mechanisms and functions needed for a future data sharing society.

Program December 4 ((Friday)

Commemorative Forum

Session 1
Expectations of the Next SINET from the Perspective of Education and Research—Online Education, GIGA Schools, and Society 5.0

Moderator
AIDA, Kento
[Professor, Information Systems Architecture Science Research Division, NII / Director, Cyber Science Infrastructure Development Department, NII / Director, Center for Cloud Research and Development, NII]

Panelists
TAURA, Kenjiro
[Professor and Director, Information Technology Center, The University of Tokyo]
SHIMOJO, Shinji
[Professor and Director, Cybermedia Center, Osaka University]
FUKUDA, Hideyuki
[SE Manager No. 2, West Japan Systems Engineering, Public Sector & Commercial Systems Engineering, Cisco Systems G.K.]
YABUKAMI, Kenji
[Manager, Education and Training Section, Himeji General Education Center, Himeji City Board of Education]
SHIRAKI, Yoshihiro
[Manager, Industry Investment Division, Economic Affairs Department, Asahikawa City]
URUSHIDANI, Shigeo
[Vice Director General, NII]

Session 2
Data Sharing from the Perspectives of Nation, Academia, and Private Sector

Moderator
YAMAJI, Kazutsuna
[Professor, Digital Content and Media Sciences Research Division, NII / Director, Research Center for Open Science and Data Platform, NII]

Panelists
AKAIKE, Shinichi
Counselor (Integrated Strategy) to Director General for Science, Technology and Innovation Policy, Cabinet Office, Government of Japan
KIM, Dohyung
[Project Manager, SIP Smart Logistics Service Project Management Office (National Institute of Maritime, Port and Aviation Technology)]
OYAMA, Keizo
[Vice Director General, NII]
TSUNEKAWA, Mao
Research Assistant Professor, Research Center for Open Science and Data Platform, NII]

Session 3 Medical Big Data- Infrastructure for Storage and Analysis of Medical Image Data

The unprecedentedly low birthrate and aging of Japan's population along with a shortage of experienced medical specialists pose major challenges to the country's ability to maintain the quality of its medical services.
To help solve this problem from an informatics perspective, in November 2017 NII established its Research Center for Medical Bigdata (RCMB). For this session, we invited people who are working on the cutting edge of the medical field to discuss the promise and prospects of data accumulation and analysis infrastructure and the potential of AI-based medical support in the coming years.

Session 4 What University Libraries Expect from NII After the Pandemic

For this session, a number of university library directors who have been busy solving problems at universities hit by the COVID-19 pandemic were invited to discuss the likely transformation of libraries over the coming years, with reference to how universities and libraries have responded this year to the special demands posed by COVID-19. We also talked about some of the challenges and functions that university libraries would like NII to take on.

Session 5 CRIS—Robust Knowledge Infrastructure and Problem-Solving Technology

The Center for Robust Intelligence and Social Technology (CRIS), established in collaboration by NII and LINE Corporation, aims to produce seeds of technological innovation based on new scientific knowledge in the areas of "robust knowledge infrastructure (robust intelligence)" and "social problem-solving technology (social technology)."
For this session, moderated by NII Director General KITSUREGAWA, Masaru, who also serves as CRIS Director, the invited panelists were EGUCHI, Kiyotaka, Executive Officer of LINE Corporation, and Kyoto University professor KAWAHARA, Tatsuya, who is taking part in a joint research project with NII and LINE, with the support of CRIS. The topics of discussion were the future of industry-university collaboration and creating innovative technologies "from seed."

EGUCHI, Kiyotaka

KAWAHARA, Tatsuya

NII Director General KITSUREGAWA, Masaru

Session 3
Medical Big Data—Infrastructure for Storage and Analysis of Medical Image Data
Moderator
SATOH, Shin'ichi
[Professor, Digital Content and Media Sciences Research Division, NII / Director, Research Center for Medical Bigdata, NII)
Panelists
YAGI, Yasushi
[Professor, Institute of Scientific and Industrial Research, Osaka University]
AKASHI, Toshiaki
[Associate Professor, Department of Radiology, Juntendo University]
YOSHIZAWA, Akihiko
[Associate Professor, Department of Diagnostic Pathology and Center for Anatomical, Pathological and Forensic Medical Researches, Kyoto University Hospital]
MORI, Kensaku
[Professor, Graduate School of Informatics; Director, Information Technology Center; Director, Strategy Office, Information and Communications Headquarters, Nagoya University / Visiting Professor, Research Center for Medical Bigdata, NII]

Session 4
What University Libraries Expect from NII After the Pandemic
Moderator
AIZAWA, Akiko
(Vice Director General, NII)
Panelists
OSUMI, Noriko
[Vice President, Tohoku University / Director, Tohoku University Libraries / Professor, Graduate School of Medicine, Tohoku University]
TAKEUCHI, Hiroya
[Vice President, University Librarian, Director of Academic Link Center, Professor, Graduate School of Humanities, Chiba University]
HIKIHARA, Takashi
[Director-General of Library Network, Director of Main Library, and Professor, Graduate School of Engineering, Kyoto University]

Session 5
CRIS—Robust Knowledge Infrastructure and Problem-Solving Technology
Moderator
KISUREGAWA, Masaru
(Director, NII / Director, Center for Robust Intelligence and Social Technology)
Panelists
EGUCHI, Kiyotaka
[Executive Officer, LINE]
KAWAHARA, Tatsuya
[Dean and Professor, Graduate School of Informatics, Kyoto University]

Since this event was held during the COVID-19 pandemic, we took all possible measures to prevent infection at the venue, including temperature checks, hand disinfection, using acrylic panels to prevent droplet dispersal, and the use of a ventilation system that effects a complete air change every eight minutes.

"20 Years of the National Institute of Informatics" is published.

To commemorate the 20th anniversary of its establishment, on November 30, the National Institute of Informatics (NII) released a commemorative publication, titled "20 Years of the National Institute of Informatics."
Featuring photos and textual materials, the book documents the evolution of the NII from 1996, during the days of its predecessor, the National Center for Science Information Systems (NACSIS), until the 20th anniversary in March 2020, including the time when NACSIS was reorganized to form the National Institute of Informatics. We hope that this publication will be widely used as a historical record for reflecting on the dramatic societal changes of the years and decades ahead.
You can download a PDF copy of the magazine (Japanese only)from the page below.
https://www.nii.ac.jp/20th/publication/

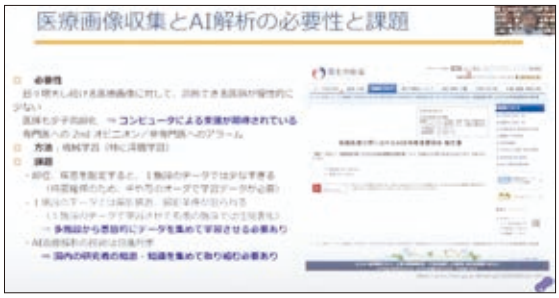
“Inter-University Research Institute Symposium 2020” Symposium is held online for the first time

Professor SATOH, Shin’ichi appears for a Research Talk session on the use of AI for medical image analysis
Online exhibitions on quantum computer technology, theoretical computer science, and next-generation academic research platforms

Over two days, October 17 and 18, NII gathered online with other inter-university research institutes across Japan that support joint research and joint use by universities and research institutes for “Inter-University Research Institute Symposium 2020—Space, Materials, Energy, Life, Information, and Human Culture: Let’s Talk with Researchers Online.” The event featured presentations of cutting-edge research conducted using large-scale research facilities, equipment, and infrastructure.

This symposium, held annually since 2010, is organized jointly by the four Inter-University Research Institute Corporations—Research Organization of Information and Systems (ROIS), to which NII belongs, the National Institutes for the Humanities (NIHU), the National Institutes of Natural Sciences (NINS), and the High Energy Accelerator Research Organization (KEK)—the Institute of Space and Astronautical Science (ISAS) of the Japan Aerospace Exploration Agency (JAXA), and the Graduate University for Advanced Studies (SOKENDAI). Due to the COVID-19 pandemic, this year’s (11th) symposium was held online for the first time. The event was also held over two days instead of the usual one, to allow more people to participate.

In the Research Talk session on the first day, researchers from different institutes offered easy-to-understand presentations of their latest research findings. SATOH, Shin’ichi of NII, Professor in the Digital Content and Media Sciences Research Division and Director of the Research Center for Medical Bigdata (RCMB), took the stage to explain RCMB’s efforts to develop a big data cloud infrastructure for medical images and to study the use of AI technology for medical image analysis. All the presentations were livestreamed via Zoom Webinar, YouTube Live, and LINE LIVE. Many viewers posed questions using Zoom Webinar, which the researchers answered in real time.



“Research Talk” presentation by Prof. SATOH, Shin’ichi

On the second day, an online exhibition was offered using a virtual space tool called Gather Town. The participating institutes had set up their own exhibition spaces within Gather Town, offering posters and videos, just like in a real-world space. The “visitors” could move their avatars around the virtual space to browse the posters and videos. During the core time, researchers were present in the exhibition space to explain their research and answer questions in real time. NII offered presentations on quantum computer technology and its future prospects, on theoretical computer science (the mathematical study of the behavior of computer programs and information systems), and on next-generation academic research platforms.

On the same day and at the same time, the National Institute of Polar Research’s “Antarctic and Arctic Junior Forum 2020” was held online. The live event featured a live video broadcast from the Showa Station (Antarctica), with wintering members of the 61st Antarctic Research Expedition party reporting on experiments proposed by winners of the Junior High and High School Polar Science Contest and answering questions from viewers.

Until last year, the symposium was held at a physical venue with about 600 participants. Without geographical limitations, this year’s online gathering attracted around 2,000 registered participants, with large numbers of viewers from all over Japan. There were even some registered participants from overseas. Some of the comments of participants were: “The Research Talk was very interesting.” “I never used Gather Town before; it’s interesting.” “Gather Town makes it easy to interact casually. It’s like attending a panel display at an academic conference.” All in all, this new style of symposium during the pandemic was very much appreciated.

The contents of each institute’s exhibits are still available on the Inter-University Research Institute Symposium 2020 website. Please take a look!

https://ius.4kikou.org/


“Gather Town,” a virtual space for exhibits and interaction


Q&A session with researchers from ROIS
(Research Organization of Information and Systems)

From “National Institute of Informatics News” to “NII Today”

Looking back on 20 years of NII history through our newsletters

From the first issue in October 2000 until its 35th issue, the “National Institute of Informatics News” reported regularly on the research activities and news of NII. Starting with the 36th issue (June 2007), we renamed the newsletter “NII Today” and turned it into a booklet with a high-impact cover page featuring an illustration connected with the main theme of the issue. To allow deeper reporting on the research and projects of NII, we focused the content on interviews with researchers. This enabled deeper reporting on the research and initiatives of NII in any easy-to-understand style. With issue No. 64 (May 2014) we updated the style of illustrations, using robots as the main characters. The covers of all issues feature robots drawn in a lively and expressive manner to represent the theme of the issue. The robot art has proved popular with readers and is now recognized as the “face” of NII Today.

No.1 2000.10
National Institute of Informatics Established
Greetings from INOSE, Hiroshi, Director General, National Institute of Informatics

No.2 2000.12
Ceremony and Celebration for the Establishment of National Institute of Informatics

No.3 2001.2
Outline of Super SINET Concept

No.4 2001.4
Inaugural Address by SUEMATSU, Yasuharu, Director General, National Institute of Informatics

No.5 2001.6
International Conference on Dublin Core Metadata Element Set

No.6 2001.9
Establishing the Department of Informatics in the Graduate University for Advanced Studies (SOKENDAI)

No.7 2001.10
Conference and Symposium on Super SINET Promotion

No.8 2002.1
Tokyo Symposium of Digital Silk Roads

No.9 2002.3
Successful Launch of Super SINET—World’s Fastest 10-Gbps Network

No.10 2002.6
Ph.D. Program in Informatics (Ph.D. course) Accepts 14 New Students

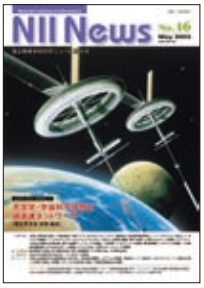
No.11 2002.8
“Informatics Studies for the Foundations of IT Evolution” Project Meeting

No.12 2002.10
Third Papillon Project Annual Workshop

No.13 2002.11
Conference Reporting the Results of the Third NTCIR Workshop

No.14 2003.1
New Developments in High-Energy Physics and Nuclear Fusion Science Resulting from Super SINET

No.15 2003.3
Nanotechnology Research using Supercomputers



No.16 2003.5
Astronomy and Space Science with an Ultra-High-Speed Network

No.17 2003.7
Opening Ceremony of the Center for Grid Research and Development (NAREGI), followed by a Commemorative Lecture

No.18 2003.9
Bioinformatics and Super SINET

No.19 2003.11
Grid Research Based on Super SINET

No.20 2004.1
Research on Developing Efficient Algorithms for Knowledge Discovering from Semi-Structured Databases

No.21 2004.3
Southeast Asian Interactive Atlas 500-1500 C.E.

No.22 2004.5
NII Joint Research Program Report

No.23 2004.7
Research on e-Community Money System—Feasibility Study of Currency Exchange among Geographically Distant Communities

No.24 2004.9
Basic and Applied Informatics for Solving Practical Problems in Chemistry

No.25 2004.11
Research on d-Commerce

No.26 2005.2
Joint Research and Workshop on Constraint Programming

No.27 2005.4
Inauguration Address by SAKAUCHI, Masao, Director General, NII / Research on Keyword-map Information Visualization Systems

No.28 2005.8
NII Joint Research "Interaction Design for Adaptation between a Human and an Agent"

No.29 2005.11
Ultrasound Applications

No.30 2005.12
Ethernet Strategy using VLAN for PC Clusters

No.31 2006.2
Research into Web Communications and Interaction using Metadata

No.32 2006.6
Information-Accessing Techniques in a Multiple Media Environment

No.33 2006.8
Study into the Relationships between Different Pieces of Information for Integrating a Wide Variety of Information

No.34 2006.12
Focus in Natural Language / Pill Bugs: Are They Intelligent? / Message from Foreign Researcher

No.35 2007.3
A Robot that Learns Humans Behavior / Evaluation of Competition in the Field of Optic Access Services

No.36 2007.6
Beyond the "Information Explosion"

No.37 2007.9
Creating Fusion from Transdisciplinary

No.38 2007.12
Get Excited by "NetCommons"

No.39 2008.3
SINET3, the Academic Lifeline

No.40 2008.6
ICT Governance—Technology vs. Legal System

No.41 2008.9
Compute by "Cooling" Quantum System

No.42 2008.12
Computer Vision

No.43 2009.3
Create the Infrastructure for Knowledge

No.44 2009.6
Interaction Design

No.45 2009.9
Seeking to Measure Research Activities

No.46 2009.12
Mathematics and Logic as the Cornerstone

No.47 2010.3
New Trend of Software Engineering

No.48 2010.6
Language—Using Language as Knowledge

No.49 2010.9
Artificial Intelligence—From Personal to Social Knowledge

No.50 2010.12
Grid × e-Science—Connecting Data, Harnessing Data

No.51 2011.2
Security—Towards a Safe, Secure Society

No.52 2011.6
SINET4—The Next Stage of Information Lifelines

No.53 2011.9
Information and Human Society—The New Relationship between Society and Media

No.54 2011.12
Green Innovation through ICT

No.55 2012.3
Web Data-Driven Information Flow

No.56 2012.6
The Academic Cloud

No.57 2012.9
Multimedia Sensing

No.58 2012.12
GakuNin Academic Access Management Federation

No.59 2013.3
The New World Being Created by Ultra-High Speed Database Engines

No.60 2013.6
Todai Robot Project

No.61 2013.9
Next-Generation Wireless Network

No.62 2013.12
Can a Robot Join an Idobata Kaigi?

No.63 2014.3
CPS—Connecting the Real World and the Cyber World

No.64 2014.5
Personal Data—Can Privacy and the Use and Application of Data Be Compatible?

No.65 2014.9
Synthesis and Recognition of Speech—Creating and Listening to Speech

No.66 2014.12
Combining Research on Algorithms and Mathematics

No.67 2015.3
Images—New Trends Arising from Information Technology

No.68 2015.5
Tokyo Olympics and Paralympics Edition Vol. 1—Contribution of Informatics to the Games

No.69 2015.9
Virtual Currency Technologies and Challenges

No.70 2015.12
Crowdsourcing/Crowdsensing—Leveraging the Power of the Crowd in Science

No.71 2016.3
Open Science—The Potential of Open Data

No.72 2016.5
Start of SINET5—Opening Up New Possibilities with 100Gbps Nationwide

No.73 2016.9
CPS – The Future Innovations by Real World × IT

No.74 2016.12
Regional Revitalization—The Role of Informatics

No.75 2017.3
Developing Cyber Security Human Resources

No.76 2017.6
The Olympiad in Informatics

No.77 2017.9
Extending Formal Methods to Manufacturing

No.78 2017.12
Decoding the World with Network Analysis

No.79 2018.3
New Support for Medical Care Using IT

No.80 2018.6
New Support for Medical Care Using IT (Part II)

No.81 2018.9
New Software Engineering for Machine Learning

No.82 2018.12
Roads to Open Access

No.83 2019.3
Society 5.0 Supported by SINET

No.84 2019.6
The Forefront of Computer Vision Research

No.85 2019.9
Tackling Fakes

No.86 2019.12
Robotics and Informatics

No.87 2020.3
"Informatics Genius Program" is Launched

No.88 2020.7
Using IT to Combat COVID-19

No.89 2020.9
Tackling COVID-19—A Challenge for Informatics

No.90 2020.12
20 Years of NII and What Lies Ahead

NII Jr. 2018
2018.6 (pamphlet)
Aim to Become a Future Informatics Olympian!

NII Jr. 2019①
2019.3 (poster)
Let's Learn with Bit-kun the Info Dog! Algorithms! Vol.1

NII Jr. 2019②
2019.5 (pamphlet)
Let's Learn with Bit-kun the Info Dog! Algorithms!

NII Jr. 2019③
2019.8 (poster)
Let's Learn with Bit-kun the Info Dog! Algorithms! Vol.2

NII Jr. 2020
2020.8 (poster)
Let's Learn with Bit-kun the Info Dog! Information Delivery

NII also publishes NII Today Jr™ for children!

Essay

Similar, Not similar

MURAKAMI, Yoichiro
Professor Emeritus,
The University of Tokyo
Professor Emeritus,
International Christian University

Reflecting on how I got started in computer science, I recall as a student reading Norbert Wiener, learning information theory under the guidance of Prof. KITAGAWA, Toshio and devouring Jaglom's "An Introduction to Information Theory" (Misuzu Shobo). This was still the era of "Tora-chan" computing (Tiger hand-cranked calculator). Rumors swirled that a genius in Prof. TAKAHASHI, Hidetoshi's lab by the name of GOTO, Eiichi had invented something special.

I was fortunate to meet another genius around that time, a physicist, WATANABE, Satoshi. While staying in Europe, he studied under the two giants of early quantum mechanics, de Broglie in France and Heisenberg in Germany. After moving to the U.S., his interests broadened still further. He was a kind of intellectual titan, taking it upon himself to tie together theoretical physics and human perception with his own brand of mathematics and information theory.

Satoshi-sensei had a pet theorem with a strange name, the "ugly duckling theorem." The mathematics underlying it is an interplay of lattice theory, set theory (of course), and mathematical logic. This "WATANABE's theorem" can take on a very peculiar nuance when it is connected to the real world. The real-world interpretation is that any two things in the world can be said to be as "similar" to each other as "dissimilar" (or vice versa). This seems to defy commonsense, since it posits that a broom and the sun are just as similar as the two Peanuts Yumi-san and Emi-san.*

However, if we follow the proof according to lattice theory, we can see that there is no mistake here. For this, we make use of a tool known as the predicate-object table. We map object O to the column of a matrix and predicate P to the rows. If object On matches predicate Pm, we assign a value of $< 1 >$; if not a value of $< 0 >$. This can be expressed by the matrix value of $< 1, 0 >$ for $< O, P >$. Naturally, two objects that have many predicates of type $< 1, 0 >$ in common will be "similar." However, if we extend the columns of the matrix for the object O, adding all the necessary and sufficient operations of lattice theory, we end up with the result that all objects in the matrix end up having the same value, $< 1, 0 >$!

At this point, it's necessary to introduce a "weighting function" for predicates, unique to specific objects. Like a probability function, this is expressed as a numerical value between $< 0 >$ and $< 1 >$, with the sum of all values equal to $< 1 >$. This function is applied to all predicates. Since many predicates, Pm, can only be assigned a value of $< 0 >$, they disappear from the calculation. This operation enables us to return to the world of commonsense.

The epistemological implications of this theorem are quite interesting, so I recommend devoting a little time to reflecting on them.

Note

Twin female singers of popular 1960s singing group, "The Peanuts"

Future Schedule

January 19 and 20, 2021 | 2020 Explanatory and Consultation Session on NII Services (online)
For details, see: https://www.nii.ac.jp/openforum/2020/setsumeikai2020.html

Information

A special issue of NII Today, "A New Informatics for Social Change after the Pandemic—Dialogues with Key Persons," was published (online only).

What role should IT and informatics play in this period of great change, and how will society change after the COVID-19 pandemic? Based on the current efforts, challenges, and predictions for the future, key figures from various fields and Director General KITSUREGAWA will discuss expectations for the new informatics and disseminate their messages to society at large. It can be viewed at the following website:

https://www.nii.ac.jp/today/2020sp/

Notes on cover illustration

In April 2020, the NII celebrated its 20th anniversary, and many robots came to celebrate the occasion at the National Center of Sciences Building, where the NII is based. With a serious commitment to fulfilling its role as an inter-university research institute, NII will continue to drive cutting-edge informatics research.

Weaving Information into Knowledge
NII

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