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NII Interview



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Active Use of IT in Regional Revitalization

Jun Takahashi (Deputy Director-General, Headquarters for Overcoming Population Decline and Vitalizing Local Economy in Japan, Cabinet Secretariat / Councilor, Cabinet Secretariat)

Interviewer: Makoto Hara (Senior Staff Writer, Asahi Shimbun Company.)

With the aim of resolving some of the problems facing Japan, including population decline, an aging population combined with a low birth rate, and declining regional economies, the government is "regional revitalization," promoting which involves each region taking advantage of their unique characteristics to create autonomous, sustainable communities. The government expects the use of data and information technology (IT) to be an effective means of enhancing the competitive strength of the regions. For example, the Cabinet Secretariat Headquarters for Overcoming Population

Decline and Vitalizing Local Economy in Japan has introduced a unique Regional Economy Society Analyzing System (RESAS). I asked Jun Takahashi, Deputy Director-General of the Headquarters, which is promoting regional revitalization in close cooperation with the Cabinet Office's Office for the Promotion of Regional Revitalization, about the government's initiatives for regional revitalization and its hopes for data utilization and IT.

Hara: The Headquarters for Overcoming Population Decline and Vitalizing Local

Jun Takahashi

Graduated from the Faculty of Law, University of Tokyo. Joined the Ministry of International Trade and Industry (now, Ministry of Economy, Trade and Industry (METI)) in 1988. Worked as Director of Information Services Industry Division, Commerce and Information Policy Bureau; Counselor, Minister's Secretariat (responsible for Commerce, Distribution and Industrial Safety Policy Group); and Director of Regional Economic and Industrial Policy Division, Regional Economic and Industrial Policy Group, Economic and Industrial Policy Bureau. Took up his present post in August 2016.



Economy in Japan was established two years ago, and regional revitalization is underway, but how is it different from previous initiatives to boost the economic development of regional towns?

Takahashi: The main difference is that behind it there is a strong sense of urgency regarding Japan's population problem. The number of births/birth rate in Japan has been on a downward trend since the mid-1970s, and although it has recovered slightly in recent years, the total fertility rate (an index showing the number of children a women gives birth to in her lifetime) has been below the level at which population size can be sustained (2.07) for more than forty years.

Looking just at the birth rate, it is higher in rural areas, and lower by far in Tokyo. However, the heavy concentration of population in Tokyo due to migration from rural areas to the Tokyo Area shows no sign of stopping. In other words, even though birth rates are high in rural areas, regional populations are not actually increasing. The low retention rate of young women in rural areas is a particularly serious problem. Of course, the reason why Tokyo attracts people is that it is such a pleasant, safe, and livable city, and this is an important part of Japan's appeal. However, if this heavy concentration of the population in Tokyo continues unchecked, depopulation could eventually cause problems, not just in those areas, but in urban areas as well, where it could have grave consequences such as a shrinking workforce and inadequate medical/nursing facilities.

Hara: Regional revitalization is a means of pragmatic problem-solving, isn't it?

Takahashi: Yes. In fact, even in Tokyo, the birth rate is recovering in Chuo Ward and other areas of the city center as a result of improvements in the environment for raising children. If Tokyo is the most livable place as long as people can afford it, it could encourage an attitude that regional revitalization is unnecessary. Rather than becoming hung up just on the issue of population, now is the time to predict appropriate population ratios that allow maintenance and development of both Tokyo and rural areas, and to seriously consider what approach to national land we should be aiming for.

In this context, the Headquarters for Overcoming Population Decline and Vitalizing Local Economy in Japan is working on various measures to increase jobs in rural areas, to generate the flow of people to those areas to improve the environment for marriage/childbirth/childcare for the younger generation, and to preserve comfortable lifestyles.

Hara: An important question is how these measures will be implemented with limited resources.

Takahashi: That's right. The national government's approach is not just to present a model of how the measures should be implemented, but to invest people, money, and information to the greatest extent possible by sending people to regions that have an insufficient number of people, offering grants for pioneering businesses in each region, and providing information. However, at the end of the day, the driving force is the local government, and a prerequisite is that local governments themselves see the population issue as an urgent problem and proactively work out strategies. Therefore, the Act on Overcoming Population Decline and Vitalizing Local Economy in Japan was enforced in 2014, and all prefectures and municipalities are now required to formulate a Regional Population Vision and a Regional Comprehensive Strategy. No matter how small their population, regions with local government leaders who develop strategies fully and tackle issues without being afraid of friction will be stronger, and they will be able to survive.

Meanwhile, the integration of urban functions and the formation of compact cities must also be promoted in order to make effective use of limited resources.

Hara: Another consideration is that the value of regions with untouched nature or historical heritage will increase more than regions that have been partially developed. Rather than population size, the attitude of local governments is being called into question. Regarding provision of information, the Regional Economy Society Analyzing

System (RESAS*) was released in April of last year.

Takahashi: RESAS is a system that collects diverse big data concerning regional economies, such as flows of people, business-to-business transactions, changes in demographics, and so on, and visualizes the data in a clearly understandable way. To revitalize regions, we want to accurately grasp a true picture of their current state, and then objectively predict future scenarios and use these to examine and implement measures appropriate for their actual circumstances and attributes.

Specifically, there are four menus— Industry Map, Population Map, Tourism Map, and Local Government Comparison Map—and these allow users to, for example, get an overview of industrial structures or to visually check connections between locations. From this November, users also became able to process the data. We also want local governments to make active use of RESAS when defining key performance indicators (KPIs) in their earlier-mentioned regional comprehensive strategies.

Hara: It seems as though it could also be used in regional branding and marketing. Takahashi: It is valuable not only in branding and marketing of local specialty products

but also in areas such as formulating tourism policies using movement of people or other dynamic data. Hereafter, we want to provide data that is easier to use by promoting the development of indices, not just at the prefectural level, but also at the level of local government. We want people to use the data in various ways, and if there are any brilliant ideas, we plan to share them by way of a contest or something similar.

Hara: It seems that advanced IT such as the Internet of Things (IoT), artificial intelligence (AI), and robots can also play a role in covering the shortfall in the working population.

Takahashi: In rural areas, increasing the productivity of service industries is an important issue. How AI and robots will be involved in that is unknown, but it may be possible, for example, to introduce robots into nursing activities, or to use AI in data analysis to discover unexpected connections that will lead to innovation.

Before that, however, there are still many things that can be done with existing IT. For example, a hot spring hotel named Jinya in Hadano City, Kanagawa Prefecture, was facing a crisis that threatened its survival, but the management succeeded in turning the business around by improving efficiency through measures such as moving the reservation system to the Cloud and linking with social media. It also created a new business model by offering "Jinya Connect," the cloud application that it had introduced at that time, to other inns and hotels. Big data and IT are crucial to regional revitalization, and we have high hopes for further progress and implementation in society.

(Photography by Mito Takahashi)

*RESAS https://resas.go.jp/#/13/13101

A Word from the Interviewer



In the past, the question of how to extract money from the government and how to be more like Tokyo based on a model provided by the government was vital in the development of local economies. This was a central task for local governments, and one that was easier the closer the region was to Tokyo and the larger its population.

However, an information society in which the Internet, big data, AI, and so on can be used relatively easily may turn this convention on its head. It may be that, precisely because of their size, small towns become better able to attract unique investments that focus on a single luxury product or service. Rural areas far from Tokyo that are undeveloped and unspoiled may find particular value in the transmitted information. I hope that we will begin to see innovative examples that change the whole concept of regional revitalization.

Makoto Hara

Graduated from the School of Commerce, Waseda University in 1985. After working at Nikkei Inc., joined the Asahi Shimbun Company in 1988. As a business reporter, covered policy at the Ministry of Finance, the Ministry of Economy, Trade and Industry, the Financial Services Agency, the Ministry of Internal Affairs and Communications, and the Bank of Japan, as well as covering the private sector including finance and energy. Worked as editorial writer responsible for business editorials and as chief duty editor of the morning edition, before taking up his current role as senior staff writer for economics. Has authored Nihon Ippatsuya Ron (Japan the One-Hit Wonder), Keizai Nyusu no Urayomi Fukayomi (Reading Between the Lines of Economic News) (both published by Asahi Shimbun Publications Inc.), and co-authored Ushinawareta 20 Nen (The Lost Two Decades) (Iwanami Shoten) and Fuantaikoku Nippon (Japan the Uneasy Giant) (Asahi Shimbun Company).

Open Innovation in the Manufacturing City of Sabae

Commercial PrivacyVisor brought about by tradition of eyewear manufacturing

Hyakuo Makino (Mayor of Sabae City) Isao Echizen

(Professor, Digital Content and Media Sciences Research Division, National Institute of Informatics /Professor, School of Multidisciplinary Sciences, The Graduate University for Advanced Studies)

Known as the "City of Glasses," Sabae in Fukui Prefecture produces more than 95% of the eyewear frames made in Japan. Using the city's technology, the PrivacyVisor, which is based on cutting-edge research on privacy protection technology carried out by Professor Isao Echizen of the National Institute of Informatics (NII), has recently reached completion, and eyewear material trading companies in Sabae City have begun taking pre-orders. The product is attracting attention both domestically and internationally as a breakthrough in privacy protection, and its development in a local region through collaboration between industry, government, and academia can be regarded as an innovative model for regional revitalization. Hyakuo Makino, Mayor of

Sabae City, and Professor Echizen talked about the background to the development.

"Open" is key

Echizen: My first contact with the mayor was when I approached him to request the help of Sabae City's eyewear industry in the trial production of the PrivacyVisor, which came about through my research on information security and privacy protection technology. My research was carried out with a view to implementation in society, so it wouldn't have gone ahead unless we had a product that could actually be worn. The mayor agreed willingly to my proposal of joint development, and he acted as an intermediary with manufacturers possessing advanced manufacturing technology.

Makino: I was glad to be approached. In Sabae City, with a focus on sharing information between the government and the public, we launched an initiative to convert administrative information into open data called Data City Sabae around 2010, and our relationship with NII began at that time. Currently, the city has released a wide variety of administrative data, and we are seeing open innovation begin as a steady stream of private-sector companies and citizens make use of that data to develop useful applications.

However, sharing information requires the use of social network services (SNSs) and other information technology (IT)

Hyakuo Makino

Born in Sabae City in 1941. After retiring as Director of Department of General Affairs, Fukui Prefectural Government, in 2001, took up the post of (ninth) Deputy Mayor of Obama City in the same year, and became a member of Fukui Prefectural Assembly in 2003. Became (sixth) Mayor of Sabae City in 2004. Fourth term in office from October 2016. tools, and people have apprehensions about invasions of privacy. The PrivacyVisor will be one solution to this, and I hope that it will bring about new developments in open innovation. I also thing that linking the technology of Sabae the "City of Glasses" with the results of cutting-edge informatics research is very significant.

Echizen: From a researcher's perspective, when I appealed to people in Sabae City, they responded immediately. That surprised me. It appears as though local regeneration is being taken very seriously.

Makino: Local governments tend to have their hands full protecting the information they have, but citizen participation and cooperation is vital for regional development. While most local governments are worried about the drain of young people to the big cities, the population of Sabae City is growing year after year. I think that one of the reasons for this is that we are continually trying to innovate despite the risks.

City hall also endeavors to ensure that its administration reflects the opinions of young people in particular. For example, entering into its third year this year is the Sabae City Office Joshi Kosei (JK; female high school student) Section Project, in which female high school students suggest community development ideas and participate in activities in collaboration with city hall. This project won the Minister of Internal Affairs and Communications' (MIC) Hometown Development Grand Prize in 2015. In addition, the local regeneration plan contest called "Be a Mayor of Sabae City" also gathers the views of young people. These kinds of initiatives have gathered momentum for regeneration activities in cooperation with citizens. By going further with these initiatives, we hope to create a "Sabae model" for regional

revitalization through open data and local regeneration projects.

"Spirit of mutual aid" made advanced product a reality

Echizen: Three years have passed since NII and five manufacturers in the city of Sabae began joint development of the PrivacyVisor in 2013, and in May of this year, they reached the point of starting to manufacture to order a mass-production model that looks and feels great. The PrivacyVisor is a unique eyewear product. The subtle curve and special structure required the use of advanced manufacturing and processing technologies to produce a material as light and strong as titanium. Sabae's technological capabilities were critical in achieving this. In addition, some of the financing took advantage of Sabae City's crowdfunding scheme, FAAVO Sabae.

Makino: It is impossible to develop creative products if technicians withhold their skills and techniques. Sabae's eyewear industry consists of specialized manufacturers. Technicians reach the pinnacle of expertise in dies if they work for a die manufacturer, or screws if they work for a screw manufacturer. Their culture is such that they cooperate in product development and make information open to each other. That is precisely why they are able to accomplish challenging product development in short periods of time.

The spiritual climate is also a factor. The head temples of two of the 10 schools of Jodo Shinshu Buddhism are located in Sabae and the religious spirit of mutual aid has been a part of life in the region since the days of Shinran, the founder of the Jodo Shinshu sect. We try to create better things by pooling our wisdom, rather than concealing it. And we never think ill of someone who has tried something new and failed. This means that we have had the perfect spiritual climate for experimental product development from the very beginning.

Towards global manufacturing

Echizen: The more I find out about Sabae, the more I am amazed by the extent of the city's potential. Its technological capabilities go without saying, but it also has a literacy that makes it receptive to advanced IT solutions, and it has the education that fosters that literacy. Moreover, both manufacturers and city hall are quick when it comes to decision-making. I am convinced



Photograph PrivacyVisor (mass-production model/available by pre-order from Nissey Corporation) The growth of SNSs and improvements in facial recognition technology have led to problems concerning invasion of privacy when people appear unintentionally in images posted online. Therefore, since around 2011, Professor Echizen has been engaged in developing a technology called PrivacyVisor, which makes it difficult to identify a person from their face when it is captured on camera. There has been a huge response domestically and internationally since the technology was announced, as well as many requests for appearances in the media and at exhibitions. PrivacyVisor is on display in the permanent collection of the German Museum of Technology, and also made waves at the International Optical Fair Tokyo. (See NII Today (English edition) Issue No. 50, P8-9 for technical details.

that all the solutions to regional revitalization are in Sabae! I hope that the city will be able to showcase its strength to the world. **Makino**: The Japan External Trade Organization (JETRO) is supporting the development of new overseas markets for eyewear using the Sabae brand, and Sabae glasses won the first Cool Japan Award in 2015. Several major global IT companies have also said that they want to contribute to Sabae City's innovation from the perspective of corporate social responsibility (CSR). Encouraged by this kind of assistance, we hope to keep extending the Sabae brand across the world.

However, some have concerns that intellectual property will drain overseas. This is an issue inherent in open innovation, but there will be no regional revitalization without innovation. It is also important in preserving and strengthening local industries, and halting the drain of young people to other areas.

Echizen: I can sense everyone's pride in the Sabae brand. There is a real determination to create an original brand. Just the other day, I gave a lesson about privacy and IT at an elementary school in Sabae City using the PrivacyVisor as a teaching resource, and I think that this kind of initiative also ties in with local regeneration.

Makino: Interaction with central researchers helps to build confidence, and literacy in informatics in particular will be vital for Sabae in the future. We definitely want to continue these kinds of initiatives.

Sabae is now seeking to become a center for advanced technology and product development, not only for the eyewear industry, but also in the fields of medical and wearable devices, through collaborations between industry, government, and academia. With the help of NII, we hope to push ahead even more powerfully so that we are able to cultivate new industries within the region and become, not a Silicon Valley, but a Titanium Valley, Medical Valley, or Wearable Valley.

> (Written by Masahiro Doi. Photography by Shoichi Midoro)

Isao Echizen

Making Use of Informatics Research in Local Regeneration

1 IT and Big Data in Tourism Promotion Attracting foreign tourists with film location information

Nabekanmuriyama Park in Nagasaki was used as a film location in "The Lion Standing in the Wind", a movie about a doctor working as a medical volunteer in Kenya. The actor who played the doctor, Takao Osawa, also starred in the drama Jin, which featured Nagasaki's Higashi-yamate No. 12 Building. Collaborative research between groups led by Professor Noboru Sonehara of NII's Information and Society Research Division and Professor Toru Kobayashi at the Graduate School of Engineering, Nagasaki University, has resulted in an application called Nagasaki Location Navigation, which makes use of information about film locations in Nagasaki to promote local tourism.

The Sonehara Laboratory is engaged in research and development aimed at creating "data-centric policy science." This research attempts to support rational policymaking based on evidence (scientific grounds) by collecting and analyzing "social big data" that reflects the circumstances and behavior of humans and society, such as Internet and Social Network Service (Web/SNS) data, public statistical data, local government open data, and Internet of Things (IoT) sensing data. One example is the construction of an information analysis platform capable of identifying the behavior of tourists within an area more comprehensively, including travel, accommodation, and eating and drinking, in order to allow local tourism policies to be determined based on evidence.

Naturally, Sonehara Laboratory also carries out a great deal of research in collaboration with various industries in the region. With Nagasaki University, it is carrying out joint research and development on linking Web/SNS data and open data, and the Nagasaki Film & Media Commission is cooperating with Nagasaki Location Navigation.

Tourism promotion is a main pillar of regional revitalization, and resolving the issues involved in promoting tourism requires the use of cutting-edge information and communications technology (ICT) and big data. The city of Nagasaki made a bid for the Japan Tourism Agency's Tourism Nation Showcase, and was selected as one of three cities across Japan in January of this year. The aim of the Tourism Nation Showcase is to create model sightseeing regions popular with foreign tourists. Accordingly, in February, the city of Nagasaki entered into a comprehensive partnership agreement with Nagasaki University and Nippon Telegraph and Telephone West Corporation regarding the use and application of ICT in boosting tourism. As



Figure Users of Nagasaki Location Navigation can search for multiple film and drama locations using the names of cast members

an example of this, Nagasaki University unveiled the Nagasaki Location Navigation at the agreement signing ceremony.

The Nagasaki Location Navigation uses a self-extending open data platform developed through collaborative research. The system retains a "core" of existing content in the form of open data, and expands the content by incorporating the latest information transmitted via SNS. It converts location information into open data in multiple languages, and accommodates English, Korean, and Chinese, in addition to Japanese. "We thought that it was necessary to respond to foreigners who are interested in Japanese films, drama, and actors. We hope that this app will encourage more foreign tourists to visit Nagasaki," says Professor Kobayashi.

Using the self-expanding open data platform, it is possible to develop a tourism application matched to each region by converting existing tourism content such as film location information into open data and developing the user interface section. "An example that worked well in one region can be applied to other regions," says Professor Sonehara. NII offers a destination management organization (DMO) platform that regions can tailor to their respective characteristics. To do so, local universities must cooperate with regional communities and local governments. "NII is connected via a network to universities nationwide. We want to expand an initiative that allows each location's distinctive DMO to be linked to the Cloud." says Professor Sonehara. Backed by the National Institute of Information and Communications Technology's research and development on fundamental technology for use and application of social big data, the network-type support system for data-driven policymaking that is being researched and developed is also spreading to places such as Yamanashi University in Yamanashi Prefecture, Kanagawa Prefecture, Nakano Ward in Tokyo, and Sabae City in Fukui Prefecture.

(Interview/Report by Shoichi Midoro)

2 Finding a marriage partner using big data analysis Supporting Local Matchmaking With IT

The Ehime Marriage Support Center in the city of Matsuyama has incorporated big data analysis developed by NII into its matchmaking service. As a result, the rate of acceptance when a user requests a date has improved from 13% to 29%. This initiative, which is aimed at solving a regional issue using the latest information technology (IT), has won approval and was selected for a special prize in the Ministry of Internal Affairs and Communications' (MIC) Local Computerization Awards 2015 for advancing regional revitalization. Professor Takeaki Uno of NII's Principles of Informatics Research Division who worked on the big data analysis says, "The guality of the data was good, and I thought that the merits of the idea were likely to be reflected. It was interesting to be involved in something like searching for a marriage partner since the question of why we choose our partners cannot be explained by reason alone."

The Ehime Marriage Support Center opened in November 2008. As a service commissioned by the prefectural government to deal with declining marriage rates and increasing average age of marriage factors responsible for the problem of declining birth rates faced by local regions the Center was set up to help people search for a marriage partner. The Center brought many men and women together, but some people never found a partner. Therefore, the Center consulted Professor Uno, an expert in algorithm theory, to find out whether the data they had accumulated could be put to use.

Professor Uno first analyzed the behavioral patterns of people who did not end up getting married and worked to make improvements, as per the Center's request. However, he was unsuccessful. So, he devised a different approach. This approach groups people with similar preferences using their action history, such as their registered "Favorites." It then extracts people of the opposite sex registered as "Favorites" by people of the same sex in the same group, and people of the opposite sex who chose people in the same group, and displays them randomly. The finished version was launched in March 2015.

The new system using marriage search history is better at revealing the personalities of registrants for which the conventional conditional search does not bring up any differences. The system has a learning function so the accuracy with which it displays suitable people will improve the more it is used.

Many users of the service request a date with a person they have been introduced to without knowing that the person was chosen using big data analysis. A female resident of the city of Matsuyama is one such user. She had been registered with the Center for five years when she was introduced to a younger man in May of this year, after which they started dating. "Since starting my search for a marriage partner, he was the first person who I felt glad to have met."

She believed that services using big data were not for her so she hadn't used them. So she was all the more surprised when she found out in a conversation with staff at the Center that the man she had been dating for a month had been selected using big data analysis. She eventually split up with the man, but she is interested in who she could meet using the system. "I'm not expecting too much, but I do think there's a chance."

This kind of support for people searching for a marriage partner is now spreading to other prefectures, and some private-sector companies are also showing an interest.



Photograph Webpage of the Ehime Marriage Support Center introducing the system based on big data

The system connects people with people, and as such it is applicable not only to matchmaking sites but also to sites such as those that help people change their career. We have entered an age in which big data will help people find marriage partners.

(Interview/Report by Miyuki Murakawa)

SINET Supporting Regional Revitalization

Along with undertaking research in the field of informatics, NII, as an interuniversity research institute, builds and operates SINET, Japan's Science Information Network, which connects approximately 850 universities and research institutes nationwide. Supporting research and educational activities with a highly reliable, ultrafast network environment, SINET is essential infrastructure for the growth of Japan's academic community. Here, we introduce some cases in which SINET contributes to the development of information infrastructure vital to local regeneration, for example, cooperation in education in which regions are connected to Tokyo and communities are connected to communities via the network, and the construction of an academic network that is protected against disasters.

Case Report 1

SINET connects regions to Tokyo and communities to communities

Iwate University's Faculty of Agriculture was once Morioka Agriculture and Forestry College, which counted the poet Kenji Miyazawa among its students. With a tradition dating back to the opening of Morioka Agriculture and Forestry College at the beginning of the 20th century, the Department of Veterinary Medicine, one of only a few such departments in Japan, established the Cooperative Department of Veterinary Medicine with the Faculty of Agriculture, Tokyo University of Agriculture and Technology (TUAT) in AY2012. For example, Iwate University students take lectures in general animal pathology at TUAT without leaving their campus in the north of the city of Morioka, while TUAT students listen to Iwate University's lectures on equine clinical medicine from their own campus. Supporting these remote lectures carried out via a video conference system between a university in Tokyo and a regional university more than 500 kilometers away is SINET.

Since AY1990, Iwate University has also been part of The United Graduate School of Agricultural Sciences, Iwate University, together with Obihiro University of Agriculture and Veterinary Medicine, Hirosaki University, and Yamagata University. This links four national universities in Hokkaido and the Tohoku region, across the Tsugaru Strait and the Ou Mountains. The four universities have developed diverse doctoral programs, viewing their geographical separation as an advantage rather than an obstacle. These programs also make use of remote lectures via a video conference system.

Last academic year at Iwate University, a total of more than 500 remote lectures were held by the Cooperative Department of Veterinary Medicine and The United Graduate School of Agricultural Sciences. These lectures took various forms, with some sent from Iwate University, some sent from one of the other universities, and some being bidirectional. Associate Professor Takahiro Nakanishi, Deputy Director of the Super Computing and Information Sciences Center, which maintains and operates the information infrastructure for both education



Figure Network connection for remote lectures given by the Cooperative Department of Veterinary Medicine of Iwate University and Tokyo University of Agriculture and Technology

and administration at Iwate University, says, "The network is absolutely vital to our educational activities and university operation. It has become such familiar infrastructure in our day-to-day work that doing something using the network feels no different from doing something using electricity."

Iwate University was hit by the Great East Japan Earthquake on March 11, 2011. Immediately afterwards, staff of the Super Computing and Information Sciences Center went to the disaster area as volunteers and participated in a variety of support activities. Telephones could not be used for some time after the earthquake due to high traffic, and communication with departments and organizations dealing with earthquake response both on- and off-campus had to rely on emails via the network. For this reason, the fact that SINET with its robust network configuration was not interrupted by the Great East Japan Earthquake was extremely helpful in supporting the quake-hit area.

Professor Hitoaki Yoshida, then a member of staff of the Super Computing and Information Sciences Center and now belonging to the Faculty of Education, has long worked on cooperation between regional SNS in places throughout the country, including Morioka. These networks connecting regions to regions on a nationwide scale survived with SINET. During the earthquake disaster, appeals for aid on the regional SNS in Morioka City, named Morionet, were answered by regional SNS in other areas of Japan. The relaying of information via regional SNS around the country resulted in relief supplies being delivered to Iwate Prefecture from areas far away from the quake-hit area. People who were involved at the time declare that the Center's support activities would not have been feasible without SINET.

In light of this experience of a major disaster, Associate Professor Nakanishi says, "It is reassuring that, since the Great East Japan Earthquake, a data center connected to SINET has been established inside the prefecture and, with the introduction of SINET5, the network has become fully meshed."

(Interview/Report by Shoichi Midoro)

Case Report 2

Supporting Disaster-Resilient Regional Academic Networks

Japan is a country that is highly prone to earthquakes. Within just the past five years, it has been repeatedly hit by major quakes: the Great East Japan Earthquake in March 2011, the Kumamoto Earthquake in April 2016, and the Central Tottori Prefecture Earthquake in October 2016. SINET kept Japan's academic community connected throughout these disasters, without any interruptions. Building on SINET's high reliability, the Kochi Academic Information Network was constructed in an effort to improve the robustness of regional academic networks.

Connecting SINET to regional IX

The Nankai Trough (a long, thin submarine trough) located south of Shikoku is a zone that generates large-scale earthquakes, and it has caused major damage many times in the past. According to the government's Headquarters for Earthquake Research Promotion, the probability of an earthquake of magnitude 8–9 occurring within thirty years is between 60% and 70%. The occurrence of a Nankai megathrust earthquake is expected to cause enormous damage in Shikoku. However, prior to the construction of the Kochi Academic Information Network, educational institutions in Kochi Prefecture implemented their on-campus network environments and communication between campuses using commercial lines on an individual institution basis.

In SINET, the establishment of detour paths assuming multiple faults makes the network strong and sustains the sophisticated and highly reliable information infrastructure. In February 2011, the local community found out that a data center (DC) capable of being connected directly to SINET would be installed in Kochi Prefecture. The Great East Japan Earthquake occurred immediately afterwards, and so with an increased wariness about the possibility of a Nankai Trough earthquake, the academic community in the prefecture decided to take steps towards linking with SINET's stable information infrastructure.

Consequently, Kochi University, the University of Kochi, Kochi University of Technology, National Institute of Technology,

Kochi College, and Kochi Gakuen College formed the Liaison Committee of the Kochi Academic Information Network. Once the SINET Kochi DC was connected to the regional IX (Internet exchange)*installed in the city of Kochi in April 2012, the configurations of each institution's connection were changed over the course of about a year and the majority of daily communication was switched to go via SINET. The driving force behind establishing this network, Specially Appointed Professor Yutaka Kikuchi of Kochi University of Technology says, "Connecting to SINET was a big step forward in our preparedness for a Nankai Trough earthquake. We hope to further develop this framework to improve the robustness and convenience of the network."

For the future, there are plans to work on a network configuration that connects, not only to the Kochi DC but also to DCs in adjacent prefectures, to ensure connection paths to SINET in the event of a disaster. Also, when building the Kochi Academic Information Network, the participating institutions placed a point of presence (PoP) connected to the network far from the sea in the city of Nankoku, as well as in the city of Kochi, so that if either one was damaged during a disaster, the network could be maintained. There are also plans to connect this Nankoku City's PoP to SINET's Kagawa DC.

With regard to commercial Internet connections, in the past, each institution

entered into their own agreement with a provider, so the connection paths went via the Tokyo IX, and there were concerns that if the distant Greater Tokyo Area were hit by a disaster, the network in Kochi Prefecture would be cut off. With the construction of the Kochi Academic Information Network configured using the regional IX, communication within the region no longer goes via Tokyo, and even in the event of large-scale damage to the Tokyo IX due to a disaster, the participating institutions' communication will not be affected.

SINET as information lifeline

In modern life, information infrastructure such as the Internet is vital in our daily lives and work, and network disruption has such a large impact that it brings the activities of society to a halt. As Specially Appointed Professor Kikuchi points out, "When a major disaster occurs, academic institutions such as universities may become bases for life and communication, such as places of refuge and points of contact for confirming people's safety and so on." Strengthening the academic information infrastructure will not just connect the academic community but also help to protect the local community's networks. SINET is serving a vital role as information infrastructure supporting local regions.

(Interview/Report by Mito Takahashi)

*IX

(Internet exchange): A point where networks owned by Internet connection providers are interconnected.



Figure Kochi Academic Information Network configuration diagram (as of December 2016)

News Exhibition at CEATEC JAPAN 2016 Theme: Social CPS In collaboration with Hokkaido University, Osaka University, and Kyushu University



The National Institute of Informatics (NII) participated jointly with Hokkaido University, Osaka University, and Kyushu University on the theme "Social CPS: Towards Social System Infrastructure" at CEATEC JAPAN 2016, held at Makuhari Messe in Chiba on 4-7 October.

A cyber-physical system (CPS) is a system that collects and analyzes a variety of data obtained from the real world (physical) in information space (cyber), and appropriately feeds the results back to the real world. The four institutions are working together on the "Cyber-Physical Integrated IT Platform Project to Optimize Social Systems and Services", which began as a project for promoting R&D for national issues with funding from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), and they have carried out research on social CPS aimed at resolving human and social issues using IT. Based on the results of this research, NII exhibited a display about "Cyber-Physical Data Management Infrastructure" at CEATEC, and project representative Deputy Director General Jun Adachi explained the infrastruc-



ture (see top photo). Hokkaido University exhibited on the theme "Smart Snow Removal in Sapporo City: Improving the Efficiency of Snow Removal by Using Social CPS", while Osaka University and Kyushu University exhibited on the theme "Human-Centered BEMS: Seeking to Balance Individual Comfort and Energy Efficiency". In addition, each project representative gave a lecture, and explained their research contents/results and exhibit in detail.

This fiscal year, CEATEC radically shifted its focus to CPS and the Internet of Things (IoT), an initiative that is expected to support future social infrastructure. The booths belonging to NII and the three universities were located in the middle of "IoT Town", an area specially planned by the organizers to communicate the new concept. It was filled with many people every day (see lower photo).

News 2 Encouragement to graduates spreading their wings Commemorative degree medal ceremony, Department of Informatics, The Graduate **University for Advanced Studies**



On 23 September, the National Institute of Informatics (NII) held a ceremony to present commemorative degree medals and the Outstanding Student award to students of the Department of Informatics, School of Multidisciplinary Sciences, The Graduate University for Advanced Studies (see photo).

NII is involved with The Graduate University for Advanced Studies, and established the Department of Informatics in the School of Multidisciplinary Sciences. The department provides research training through 5-year and 3-year doctoral programs.

A total of fifteen students were granted degrees in the fall of AY2016: fourteen graduates of the Department of Informatics who studied at NII and one graduate of an affiliated graduate school. During the presentation ceremony, the achievements of the students were announced by their supervisor, before Director General Masaru Kitsuregawa presented each of them with their medal. In his congratulatory address,

Director General Kitsuregawa spoke about the importance of researchers having a "research attitude of deep learning", while touching on recent developments in information science, such as Alpha Go (the Al developed by Google) beating the world Go champion and Tesla Motors' cars being involved in accidents during the use of their autonomous drive function. Finally, Director General Kitsuregawa encouraged the graduates who are spreading their wings: "Please deepen your expertise but, in addition, please contribute to the society." Director General Kitsuregawa also presented a commemorative shield to Ning Zheng, who was chosen as Outstanding Student.

New students admitted in October term Guidance session held

Eleven students were admitted to the department in the October AY2016 term, and a guidance session for new students was held on 7 October (see photo), First, Professor Zhenijang Hu (Information Systems Architecture Science Research Division), Chair of Department, gave an overview of the department and explained the system of guidance, as well as other matters.

Then, the new students visited NII's library and were briefed on how to use it by library staff. Juan Navarro, an international student from Argentina, expressed his goals: "I am involved in research on natural language processing and machine learning. I hope to advance research to enable computers to understand human speech."



News ³ Exhibition at 18th Library Fair & Forum Discussion about restructuring NACSIS-CAT

The 18th Library Fair & Forum was held at Pacifico Yokohama on 8–10 November, and NII exhibited a display about the services it provides for libraries and library users, including CiNii, ERDB-JP, JAIRO Cloud, and KAKEN.

The NII forum was held on the second day on the theme "NACSIS-CAT/ILL and E-Resources: 2020 Scholarly Information Systems". Reconstruction of NACSIS-CAT (catalog information database of university libraries nationwide) and NACSIS-ILL (system of inter-library loans), both operated by NII, was explained, and services such as ERDB-JP, a data sharing service for e-resources published in Japan, were introduced. In the discussion session, opinions expressed by the panelists included: "Restructuring of NACSIS-CAT should first eliminate problem areas and aim for a complete 'soft-landing." and "We want to create the next-generation catalog information system by talking to users about what they want." Reflecting the high level of interest in future scholarly information systems, the venue was full, with approximately 250



people attending the forum, including staff from university libraries across Japan.

^{News} Director General Kitsuregawa awarded Legion of Honor Chevalier



Director General of NII Masaru Kitsuregawa was awarded the French Legion of Honor Chevalier with a decoration ceremony performed on 3 October by Thierry Dana, the French ambassador to Japan, at the French ambassador's residence (see photo). As a researcher, Director General Kitsuregawa has been engaged in database engineering research and education for many years, and has promoted pioneering research in big data analysis. Working as a core researcher on national projects, he has produced excellent research results, such as developing technology for fast processing of very large databases. Further, he has contributed to society through his positions as President of the Information Processing Society of Japan; Chair of the Committee on Informatics, Science Council of Japan (SCJ); and member of many government councils. Also, in addition to establishing the Japanese-French Laboratory for Informatics (JFLI) in 2009 to promote joint research on informatics between Japan and France, NII has entered into international exchange agreements with fifteen universities and research institutes in France, and accepts many students through the NII International Internship Program. Since taking the helm at NII in April 2013, Director General Kitsuregawa has put even more effort into promoting NII's exchange of informatics and academic research between Japan and France. This award recognizes his contribution to exchange between Japan and France, in addition to his career as a researcher.

Deputy Director General Honiden wins Minister of MEXT Award Commendation for Contribution to Promotion of Computerization by Individual or Group



The "Award for Individuals or Groups who Contributed to the Promotion of Computerization" honors individuals or groups recognized by MEXT as having made a significant contribution to the computerization of education, or to R&D in the information field. Deputy Director General Shinichi Honiden (Professor, Information Systems Architecture Science Research Division) was chosen for the Minister of MEXT Award this fiscal year, and an award ceremony was held on 3 October

(see photo).

In AY2004, Deputy Director General Honiden developed teaching materials aimed at cultivating world-class, practical IT personnel, and launched the TopSE one-year advanced IT education program to provide training based on that teaching material. Ongoing for more than ten years to date, the program spearheads Japan's development of IT personnel in industry, with more than forty lecture courses developed and more than 300 IT personnel trained. He also made a major contribution to the spread of cloud use in IT education at universities throughout Japan by building one of the world's first clouds for IT education in AY2009. This award recognizes these achievements.

News 5 Introducing Speech Recognition Technology and SINET5

Exhibition at Inter-University Research Institute Corporation Symposium 2016



The "Inter-University Research Institute Corporation Symposium 2016: Meet the Researchers!—Inter-University Research Institute Expo" was held at Akihabara UDX in Tokyo on 27 November. This symposium was an opportunity for NII and other inter-university research institutes nationwide to jointly present their research to the general public. NII gave a poster presentation and demonstration of the speech recognition and speech synthesis technology being researched and developed in the laboratory of Associate Professor Junichi Yamagishi (Digital Content and Media Sciences Research Division) (see left photograph). Speech recognition converts the human voice into text via computer, whereas speech synthesis converts language to speech through machine learning. Visitors used a microphone to speak to NII's Info Dog "Bit-kun," who appeared on a large display screen. Bit-kun recognized their speech



and replied with "Hello" and "My name is Bit," as well as explaining about NII and introducing the researchers.

In addition, NII gave a poster presentation about the Science Information Network, SINET5, that was put into operation in April of this year.

In "Researchers' Talks", where researchers from each institute spoke about the appeal of their research and latest topics, Professor Imari Sato (Digital Content and Media Sciences Research Division) appeared as NII's representative (see right photograph). On the theme "What do Tasty Foods Look Like? Discovering the World Through Light", she spoke about the "light" that allows us to see a world that is invisible to the human eye.

^{News} "Correctness of Programs" and "Interactive AI" The Forefront of Informatics: 3rd and 4th Public Lectures

In the AY2016 Public Lecture series titled "The Forefront of Informatics", the third and fourth lectures were held respectively on 20 October and 29 November.

In the third lecture, Assistant Professor Kanae Tsushima (Information Systems Architecture Science Research Division) gave a talk titled "How Can You Easily Write Correct Programs? Program Types and Debugging Techniques" (top photograph).

Assistant Professor Tsushima pointed out that programs not only operate in familiar electronic devices such as computers and smartphones but surround us everywhere, like air, in places such as stations and airports; when they work correctly, we are hardly aware of their existence, but when they operate incorrectly, it can have a major impact on society. She noted, "For us to live our lives with peace of mind, it is important that programs be correct," and explained what programs are and about "types", one method of enhancing program correctness.

The fourth lecture was titled "Interactive Intelligence: Making AI More than Just a Buzzword." Professor Seiji Yamada (Digital Content and Media Sciences Research Division), who serves as president of the Japanese Society for Artificial Intelligence, explained about interactive AI, which involves humans and AI cooperating to solve problems and make decisions (bottom photograph).

As an interactive AI research project, Professor Yamada introduced a study on human-agent interaction (HAI), which deals with interaction (exchange of information) between humans and AI agents (AI that implements sophisticated dialogue with humans and takes over some human activities). He used demonstrations to explain the research into whether there is a relationship between the appearance of anthropomorphic AI agents that recommend products in online shopping and the willingness of users to buy. Professor Yamada explained that "when users sense that the AI agent has 'intelligence' and their own 'emotions' are heightened, their trust in the Al agent increases and their willingness to buy goes up."

The fifth lecture will be held on 31 January 2017 (Tuesday), when Professor Hiroki Takakura (Information Systems Architecture Science Research Division) will give a talk titled



"Information Networks Resistant to Cyber-Attacks: Implementing Damage Control with an Overview of the Whole System". For details and registration, go to the Public Lecture page on NII's official website (http://www.nii.ac.jp/event/shimin/).

News 7 Publishing Datasets of Classical Documents Cooperating with NIJL across disciplines and organizations

NII has been working with the National Institute of Japanese Literature (NIJL) to convert classical documents belonging to the NIJL into open data, and three datasets were released in November. Each dataset is available on the NIJL website and on the website of the preparatory office of the Center for Open Data in the Humanities (CODH) of the Joint Support Center for Data Science Research, Research Organization of Information and Systems (ROIS).

Published on this occasion are the following: (1) Dataset of Japanese Classical Documents, image data of 700 classical documents; (2) Dataset of Character Styles in Japanese Classical Documents, character data for *kuzushiji* (cursive characters) used in classical documents; and (3) Dataset of Edo Period Culinary Recipes, digitized cooking procedures from an Edo period cookbook, some of which are organized into a recipe format that people can use today.

The Dataset of Japanese Classical Documents contains approximately 160,000 frames of image data and bibliographic data, some of which have information such as work introductions or reprint text data attached. As well as providing sites that allow bulk download of the image data, user-friendliness has been increased by employing a data access method that allows the image contents to be easily verified on a browser. A framework geared toward use/application, which is the next step after converting the



documents to open data, has also been built.

Next, the Dataset of Character Styles in Japanese Classical Documents was released, which comprises character image data and character coordinate data for each individual *kuzushiji* (cursive character). In addition to use as a study dataset for machine learning, this dataset could be used for human learning of *kuzushiji* and other educational purposes.

The third dataset is the Dataset of Edo Period Culinary Recipes. After the conversion of cooking procedures written in *kuzushiji* in the Edo period cookbook *Manpo ryori himitsubako* (A Secret Box of Ten Thousand Culinary Treasures) into electronic text, some were translated into modern Japanese, and then a portion of these were compiled into recipes that could easily be prepared in a modern kitchen, such as *hiyashi tamago yokan* (chilled sweet egg jelly) (see photo). The translations into modern Japanese and recipes have also been published on the recipe-sharing site Cookpad, so that the data can be widely used by the general public.

The publication of this series of datasets involved cooperation that went beyond research disciplines and beyond the framework of ROIS (NII) and NIJL. As a leader in the promotion of open science in academic communities in Japan, NII is supporting and promoting the creation of open data by Japanese research institutions.

News B Deviation score 57.1 in mock National Center Test for University Admission, 76.2 in essay-type math Todai Robot Project

The artificial intelligence project led by NII called "Can a Robot Get into the University of Tokyo?" published its results for this academic year on November 14. In the "AY2016 Shinken Mock Exam: Comprehensive Academic Ability Multiple Choice Exam /June" (in cooperation with Benesse Holdings, Inc.), which is a mock National Center Test for University Admission, the robot achieved a total score of 525 and a deviation score of 57.1 in eight subjects across five fields of study. In World History B,

Advanced TopSE course newly established

From next academic year, the TopSE education program for IT experts offered by the National Institute of Informatics will include an Advanced TopSE Course that trains personnel to solve challenging advanced problems using with a deviation score of 66.3, the robot succeeded in recording a deviation score above 65, as it did last academic year. In Physics, with a score of 62 and a deviation score of 59.0, its performance was much better than last academic year (score of 42, deviation score of 46.5). In the "AY2016 First University of Tokyo Entrance Exam Pre-Test" (in cooperation with Yoyogi Seminar, Educational Foundation Takamiya Gakuen), which is an essay-type mock test for the

cutting-edge technology. The two pillars of the course are "Professional Study", in which the students meet one-to-one with their supervisors to analyze workplace problems, and execute and evaluate tasks, etc.; and the "Advanced Software Engineering Seminar", in which all students and several faculty members have discussions with the aim of second-stage exam, the robot performed well with a deviation score of 76.2 in math (science major). In this subject, the robot implemented fully automatic problem-solving for the first time, with no human assistance at all in the process from converting the problem text written in Japanese into a computable form, to using a formula manipulation program to solve the problem, and it completed four of the six questions.

students mastering advanced industry-leading technologies. This is a one-year course starting in April. Applications to take the course will be accepted until January 31, 2017. Application information is available on the TopSE website (http://www.topse.jp/)

Topics Sign language interpretation vital for balanced discussions is well provided Report on overseas academic life—Associate Professor Bono@Netherlands

NII researchers often expand the scope of their activities by going overseas. Following on from the preceding issue of NII Today, Associate Professor Mayumi Bono of the Digital Content and Media Sciences Research Division reports on her life as a researcher overseas. Her report this time is about the local research environment.

Something that surprised me initially was the linguistic environment in working on a sign language project. Here, sign language interpretation is provided at most meetings. The help of an experienced sign language interpreter is essential in order for deaf and hearing people to have academic discussions on an equal footing.

The sign language used here is International Sign. As indicated by the absence of the word "language" in its name, International Sign is an international auxiliary language and is not regarded as a natural language. One reason for this is that there are no native speakers of International Sign. It is a kind of pidgin (a mixed language resulting from contact/ interaction between speakers of different languages) based on different sign languages. In Europe, where countries using different languages border each other, this International Sign came to be used from early on.

The other day, the sign language interpreter that we had booked for a session could not make it, and we had to request a substitute interpreter at the last minute. For forty minutes until the substitute arrived, no one started the discussion, and instead both deaf and hearing people simply waited and made small talk using sign language. In Japan, it is likely that a hearing researcher would have started the discussion using speech and clumsy sign language. However, that would have meant that the deaf people who use sign language for basic interpersonal communication would have been left out. Here, everyone waiting for the sign language interpreter to arrive was the natural thing to do.

At the Max Planck Institute for Psycholinguistics where I am doing my research, hearing people and deaf people carry out their research activities on equal terms. Having been living in the Netherlands for more than six months now, I have gradually become able to communicate with local deaf people. Recently, I discussed with researchers here a method of describing sign language communication that I developed in Japan, and I am attempting to annotate (assign relevant information to) sign languages other than Japanese Sign Language. This activity will not immediately result in a paper, but I think that time spent confirming the validity of this method and developing it into international research is important.

My daughter seems to be becoming faintly aware that my research is about understanding the communication of people who use sign



Conference of International Society for Gesture Studies held in Paris in July, where I gave an oral presentation via a sign language interpreter (left).

language. If the surroundings are noisy or we happen to be on opposite sides of a pane of glass, she will "speak" to me using sign language-like expressions. Her expressions, which are clearly different to gestures and resemble a language, are very expressive and interesting. As adults, we are only able to show certain facial expressions, and it is difficult for us to freely move our facial muscles to create a diverse range of expressions. It is perhaps important to learn from childhood that sign language exists, and that facial expressions are also an important modality (a linguistic expression that describes the speaker's judgment or opinion of the content of their speech) for conveying language.

Human Resources Administrative staff (Officially announced on November 16, 2016)

			(Assistant section managers and above)
	Name	New position	Old position
Transfers in	Satoshi Niitsuma	Assistant Section Manager, Scholarly and Academic Information Division, Cyber Science Infrastructure Development Department (Academic Content Team)	Information Management Unit Chief, Office for Information System Planning, Policy Division, Minister's Secretariat, Ministry of Education, Culture, Sports, Science and Technology (MEXT)

"Hey, this is great!" Hottest articles on Facebook and Twitter (September–November 2016)

National Institute of Informatics, NII (official) Facebook www.facebook.com/jouhouken/

Associate Prof. Utsunomiya explains applications of quantum neural networks ImPACT program research findings published in electronic edition of the US journal *Science* (10/21/2016)

The research group in which NII Associate Prof. Shoko Utsunomiya (Principles of Informatics Research Division) is involved has implemented a quantum neural network that quickly solves combinatorial optimization problems, which are considered difficult to solve efficiently using modern computers. Two papers describing this research finding were published in the electronic edition of the US journal Science on October 21. A briefing for the media was held on October 18, where Associate Prof. Utsunomiya, who played a central role in software development in this research, explained the applications of quantum neural networks.



Development of Dataset of Edo Period Culinary Recipes brings Edo culture into modern times: Edo period cookbook converted into recipes and published on Cookpad.

(11/24/2016)



Thank you to the first-year students of Gunma Prefectural Ota Girls High School, who visited NII today! I hope this study trip sparked your interest in careers as researchers! (11/02/2016)

*Some text edited/omitted.

SNS

— You're a network specialist, and yet, you write novels? (Ikezawa)

Urushidani The book I co-authored with Associate Professor Takashi Kurimoto titled *Toki Wo Utsusu Infura: Netto To Mirai* (Infrastructure That Reflects the Times: Networks and the Future)* is an academic book that explains changes in information and communication networks. However, we wanted the younger generation to feel no reservations about reading the book too, so we took the decision to present it as a novel with high school students as the main characters. The main characters are childhood friends Mirai Hitotsubashi and Marin Takehashi. The story is about the curious pair unraveling the evolution of networks on the basis of



A Network Specialist Becomes a Novelist!?

Shigeo Urushidani

(Professor, Information Systems Architecture Science Research Division)

Born in 1960. Ph.D. (Engineering) (University of Tokyo). Engaged in R&D of ultrahigh-speed, highly reliable network architectures and systems, and design/construction of various types of high-speed network. Currently responsibilities include Science Information Network (SINET).

Z.

week. You're not only an ultrahigh-speed network specialist, but also an ultrahigh-speed writer! (Laughs) Rather than being fast, I think that I concentrate on my work. But when I'm really tired, I like to spend time with my family and eat sweet things, just like Mirai.

— Ah, so your own family was the model for Mirai's family in the book.

The scenes where Mirai's family gets together and has noisy conversations are exactly like my family. The story was inspired by my family. I wanted the book to be enjoyed by people across the generations, so I added illustrated explanations and included episodes that show how each generation's communication devices were used and in what kind of situations.

----- Will the theme of your next book be the future of networks?

I can't predict how the networks that have evolved so much over the past twenty years or so will evolve in the future, or at what speed, but it is certain that, as Mirai says at the end of the book, "People are working day in, day out on developing new technology to steadily improve networks, and they are enriching our lives." I conversations with their families.

— Designing and building networks and writing books seem like completely different tasks. Is there a switch that is flipped in your head when you write?

As a researcher, I write papers, and so when I started writing this book, I wrote it in the formal style of a paper. But part way through, I thought, "This is kind of boring!" (Laughs) Looking at today's high school students with their skillful use of smartphones and SNS, I thought that it might be interesting to look at the world of past networks from their point of view. That's how the Mirai character came about.

----- Wow! That's really thinking like a novelist! And, I heard that you wrote this book in about just one



Professor Urushidani and Ayaka Ikezawa holding a copy of *Toki Wo Utsusu Infura: Netto To Mirai.* "I've learned that networks evolve at an astonishing speed," says Ayaka Ikezawa.

hope to be one of those "people".

(Written by Mito Takahashi. Photography by Aki Nagao.) *Latest edition of the NII Series of paperback books (Maruzen Library), which introduce comprehensive research on informatics promoted by NII to the general public in an easy-to-understand manner so that they can familiarize themselves with informatics.

Face-to-face with "NII People"

Mirai's father is devoted to his family—he is strong when it comes to IT, but weak when it comes to Mirai's mother. (Laughs) This overlaps with my image of Prof. Urushidani, whose eyes soften behind his glasses when he talks about his family. His main occupation is, of course, networks, but I got a sense of his "novelist's soul" as he talked about how he drew on his own family life to come up with this story and devised ways to make it an enjoyable read. He is undecided about his next book, but I would like to travel ten or twenty years into the future with Mirai and Marin.

Ayaka Ikezawa

Celebrity/Engineer. Known as "The Ruby Goddess", she is especially active in IT fields. The author of *Programming Wo Hajime Yo Idea Wo Jitsugen Saseru Saiko No Tool* (Let's Start Programming: The Best Way to Realize your Ideas) (Daiwashobo). Won the Special Jury Award at the 6th Toho Cinderella Audition.



From Information Society to Integrated Society

—Data-driven decision-making support systems-

Noboru Sonehara

Professor, Information and Society Research Division, National Institute of Informatics

Future Schedule

January 31 "The Forefront of Informatics" AY2016 Public Lectures: 5th Lecture "Information Networks Resistant to Cyber-Attacks: Implementing Damage Control with an Overview of the Whole System" (Professor Hiroki Takakura, Information Systems Architecture Science Research Division). A program of lectures in which NII researchers explain topics in advanced informatics to the general public, held six times a year. Details are available on NII's website via the link below. http://www.nii.ac.jp/event/shimin/

February 3rd SPARC Japan Seminar 2016. Details at http:// www.nii.ac.jp/sparc/

February 6 | 3rd Industry-Government-Academia Collaboration prep school, "Interaction Design for User

The industrial society was a society that circulated "information for daily life" rich in material goods. The subsequent information society is one that circulates "information for enjoyment" that promotes mental and spiritual wealth. Today, due to advanced information and communication technology, all information equipment and sensors are starting to be connected to networks, information is being circulated in digital form, and it is becoming possible for anyone to access information from anywhere at any time. Consequently, "cyber space" and the "real world" are becoming closely connected, and a "cyber-physical integrated society" in which the two fuse into one is taking form.

This kind of integrated society will be a society that circulates "information for overcoming social problems and augmenting human capabilities." For example, one social problem we face is that half of all towns and villages will have difficulty maintaining levels of public services similar to in the past due to a rapidly falling population and the concentration of people in large cities. This problem demands various forms of social innovation, including revitalization of regional economies and securing of employment opportunities, regeneration of community healthcare and advancement of health, and measures to cope with natural disasters. However, in the past, overcoming social problems was necessarily dependent on subjective policymaking and management decisions based on partial and incomplete data.

In a future integrated society, "data-driven decision-making" will become effective, and this will make logical decisions and judgments based on data that provide scientific evidence. In conjunction with this, economic development and the creation of employment opportunities in an integrated society will shift to evidence-based, knowledge-intensive service industries and intelligent information industries.

This will require the collection and analysis of social big data with a high level of public benefit, the synthesis of information systems and services, and the development of social data platforms that feed information back to people and society in a timely manner. Through research and development of a system for supporting data-driven, logical policymaking and implementation of this system in local communities, we are working to achieve "network-based data linkage infrastructure with universities that serve as 'Centers of Communities'," which will allow easy cooperation between universities and local public bodies, companies, etc. I am convinced that this kind of initiative will lead to fostering of human resources capable of using data who are required by local regions, creation of initiatives producing/ distributing/using data that are attractive to students, and "data-driven hometown revitalization".

> Interfaces in the AI Era" (provisional title) (Professor Seiji Yamada and others, Digital Content and Media Sciences Research Division). Details are available on NII's website via the following link. http://www.nii.ac.jp/research/iga/juku/

> **February 22** "The Forefront of Informatics" AY2016 Public Lectures: 6th Lecture "Human Voice? Or Computer?—The Forefront of Deep Learning in Speech Information Processing" (Specially Appointed Assistant Professor Shinji Takaki, Digital Content and Media Sciences Research Division).

> February 23–24 | Cyber Security Symposium in Dogo 2017 (Exhibitor)

> March 20–24 CeBIT2017 (international trade fair for information and communications technology) in Hanover, Germany (Exhibitor)



Notes on cover On stages that resemble miniature gardens, robots do farm work, visit a tourist attraction, and chase an insect in the countryside. The illustration depicts a hopeful, abundant world brought about by information technology in the regions.



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