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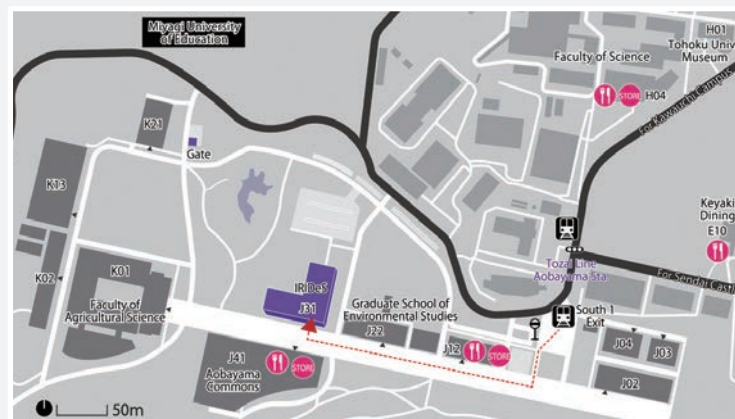
【Access】 IRIDeS, Tohoku University

468-1 Aramaki Aza-Aoba, Aoba-ku, Sendai Japan 980-8572

URL: <https://irides.tohoku.ac.jp/eng/>



3 minutes from Aobayama subway station



Contact

IRIDeS Public Relations Office

Phone: +81-22-752-2049

Email: koho-office@irides.tohoku.ac.jp

Editor's Note

The IRIDeS webpage in Japanese has been redesigned!
(<https://irides.tohoku.ac.jp/>) Revamp of our English webpage
will follow.

(Natsuko Chubachi, IRIDeS Public Relations Office)

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Conveying the results of practical disaster prevention research
from TOHOKU to the world

IRIDeS

International
Research
Institute of
Disaster
Science
Tohoku
University

NEWS

2020



Height from ground
level (m)

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-17	9
-16	10
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World Bosai Forum 2019 / Global Centre for Disaster Statistics

Academic exchange between Tohoku, Japan and Aceh, Indonesia

< Academic Research >

Progressing along the long road in the study of treatment of infectious diseases

Interdisciplinary project launched to better cope with special information
on the Nankai Trough earthquake for disaster risk reduction in society

Greetings from the Director



International Research Institute of Disaster Science (IRIDeS)
Tohoku University
Fumihiko Imamura, Director

IRIDeS was established after the Great East Japan Earthquake with the aim of advancing disaster science and constructing practical research for disaster risk reduction. It has been eight years since IRIDeS was launched, and during this time researchers from various fields have analyzed problems from disaster sites using techniques from their respective fields of expertise. We are establishing the process for creating and systematizing this multidisciplinary body of knowledge and making it available to the public. When Typhoon 19 hit Japan in 2019, IRIDeS quickly gathered information, carried out analyses, consulted with researchers outside IRIDeS, and made every effort to disseminate our assessment of the state of affairs to the public in a timely manner. In time, we aim to contribute to the advancement of science and technology by converting disaster-related information into academically valuable knowledge.

The next year being 2021, to mark the 10th year since the Great East Japan Earthquake, we would like to make further strides toward demarcating issues relating to disaster areas and disaster science. This year, Japan will welcome visitors from all over the world as it hosts the Olympics and Paralympics in Tokyo. We hope to make the most of this opportunity to help people further appreciate the progress being made toward recovery in Tohoku and promote international cooperation in prevention and reduction of disasters.

Organization
IRIDeS



Hazard and Risk Evaluation
Research Division



Human and Social Response
Research Division



Regional and Urban Reconstruction
Research Division



Disaster Science
Division



Disaster Medical
Science Division



Disaster Information Management
and Public Collaboration Division



Endowed
Research Division

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Debrief Meetings Held to Report Findings on the 2019 Typhoon 19

The year 2019 also saw the occurrence of natural disasters such as typhoons and earthquakes, including Typhoon 19 making landfall in Japan on October 12. The typhoon caused widespread damage, including human casualties, across a wide area that included Miyagi Prefecture. The IRIDeS emergency survey working group (WG) started gathering information and carrying out surveys on October 11, and convened a meeting on October 15 to share its report with



stakeholders and the public. In addition, on December 14, on Tohoku Gakuin University Tsuchitai campus, IRIDeS and the Tohoku branches of the Japan Organization of Civil Engineers, Japanese Geotechnical Society, and the Japan Landslide Society jointly held a debrief meeting regarding findings on Iwate, Miyagi and Fukushima Prefectures. Assoc. Prof. Shuji Moriguchi, the head of the emergency survey WG, says, "because there was widespread damage across a number of areas, we formed a survey group comprised of four organizations and carried out a multidisciplinary survey. Taking advantage of this cross-organizational framework, we would like to address disaster issues further, considering how to establish a safe and resilient society.

Reports related to Typhoon 19 by IRIDeS researchers are available on the IRIDeS webpage (https://irides.tohoku.ac.jp/research/prompt_investigation/typhoon19-2019.html) (in Japanese). Topics include flooding, landslides, evacuation, medical assistance, flood history and preserving historical materials.

Burst dike of the Shinkawa River, Marumori, Miyagi. (Photograph: Assoc. Prof. Shuji Moriguchi).

Report

IRIDeS International Activities

Feature 1



World Bosai Forum 2019

The first World Bosai Forum (WBF) was held in 2017. WBF is an international platform where diverse specialists and citizens gather to share experiences and knowledge of DRR. WBF aims at advancing the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030, producing concrete solutions for disaster risk reduction throughout the world.

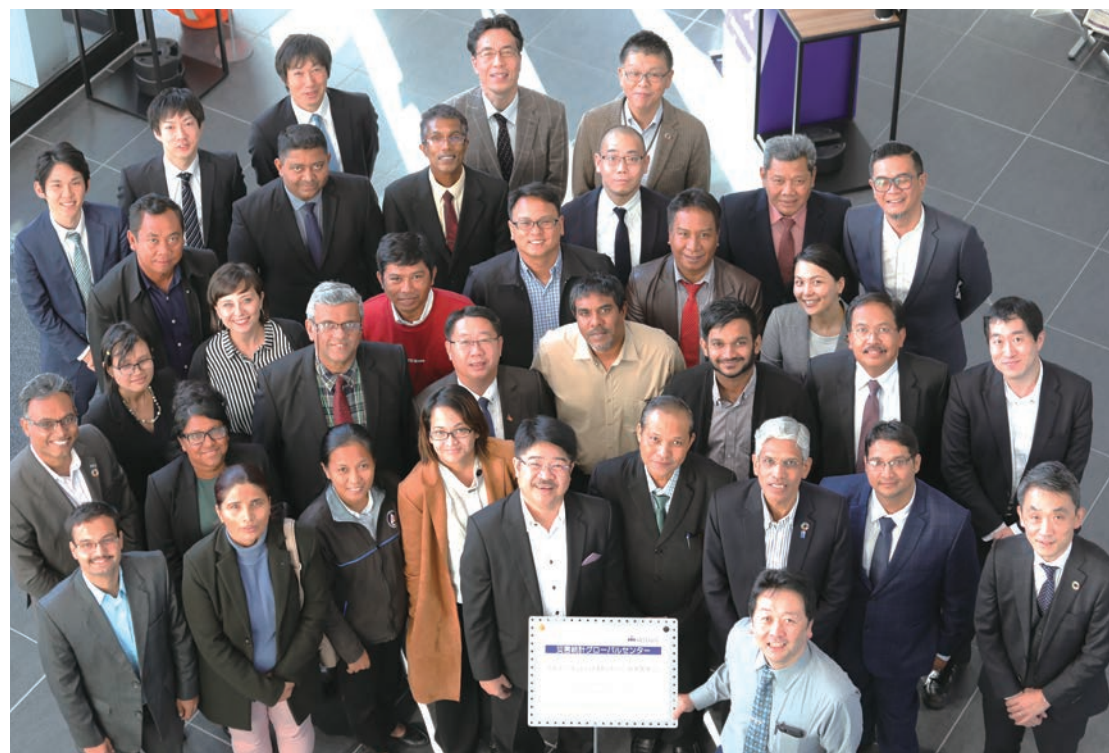
"World Bosai Forum 2019," the second WBF, was held at the Sendai International Center and Tohoku University Hagi Hall from November 9 to 12, 2019. Following the pre-WBF festival on November 9, the main conference was held from November 10 to 12, including 3 keynote addresses, 47 poster presentations, and 33 flash-talk presentations, with 14 booths by industry, NGOs, etc. There were 871 registered participants in the main conference from 38 countries and regions, including Indonesia, the Philippines, and the USA. The participating organizations included the UN, government and academic research organizations from Japan and abroad, and regional governmental bodies. The total number of participants became over 8,000, including ones who joined Sendai Bosai Mirai Forum and the Earthquake Disaster Measures Technology Expo which were held as WBF related events. The Sendai City also held a disaster area study tour.

From the second WBF, the WBF secretariat became independent from Tohoku University and handled the forum and administrative tasks, but the university continued playing an important role as it did in the first WBF. Tohoku University President Prof. Hideo Ohno and Executive Vice President Prof. Nobuyoshi Hara delivered greetings at important events, such as the opening ceremony and the session held by the core research cluster of disaster science of a Designated National University. Prof. Fumihiko Imamura, Director of IRIDeS, served as the chair of the WBF local organizing committee and planned "Symposium with presidents of three universities in Tohoku." He also supported sessions held by IRIDeS and other Tohoku University members.

To wrap up the WBF 2019, Reid Basher, the chairperson of the WBF International Steering Committee, delivered the Chair's Summary of the foremost topics discussed during the forum and shared his thoughts on issues that might be addressed in the next WBF. Director Imamura remarked, "the second WBF was successful, as there were many participants and the content of the sessions was fulfilling." He added, "we hope a larger number of the younger generation and business enterprises would join the next and third WBF. Our goal is for an open, global community for disaster risk reduction."

Global Centre for Disaster Statistics: A “Powerful Engine” to Achieve the Global Targets of the Sendai Framework for Disaster Risk Reduction

Feature 2



A meeting with pilot countries, UNDP, Fujitsu, and other corporate partners regarding disaster statistics (November 2019, IRIDeS)

Introduction

In March 2015, the Third UN World Conference on Disaster Risk Reduction was held in Sendai, wherein the “Sendai Framework for Disaster Risk Reduction 2015-2030” (hereinafter SFDRR), global disaster risk reduction (DRR) policy was adopted. The SFDRR established seven global targets as its core aims, including “Substantially reduce global disaster mortality by 2030” and “Reduce direct disaster economic loss in relation to global gross domestic product.”

On the basis of this UN conference, the “Global Centre for Disaster Statistics” (GCDS) was established in IRIDeS in April 2015. This Centre, which is led by Tohoku University, the United Nations Development Programme (UNDP), and Fujitsu Ltd. (Fujitsu), aims at achieving the core targets of the SFDRR. The sections below address the following questions: What are the specific aims of the GCDS? What are its characteristics? What activities have been implemented since its establishment?

Aims

The GCDS aims to “gather and store disaster statistics from national governments, conduct analyses along with other cooperating agencies, and redistribute the results to national governments to be utilized in their respective national DRR policy-making process.” “Disaster statistics” refers to “statistics about human and economic damage caused by disasters.” Such statistics are standard in Japan; however, these statistics have not been sufficiently established in many other countries, including the developed nations. Worldwide, for many years, measures primarily have been taken after the occurrence of disasters. The idea of DRR in disaster preparedness during normal times is relatively new; the trend for gathering disaster data during normal times to be utilized in DRR policy has finally become mainstream worldwide through the UN World Conference on Disaster Reduction/Disaster Risk Reduction, which has been held in Japan three times since 1994.

Why are disaster statistics necessary? It is because DRR cannot progress simply by just “wanting to progress.” For example, if there are no disaster statistics available for Country A, it will be difficult to ascertain its realistic situation of disaster damage. Furthermore, in Country A, it is necessary to display, for example, “mortality and economic damage decrease after investment, comparing pre- and post-investment conditions” to formulate a DRR policy, invest in DRR, and objectively investigate the investment effects. These activities cannot be performed without disaster statistics. DRR should be promoted as a set comprising situation analysis, policy making, implementation, and verification. Disaster statistics is necessary in all of those stages.

Characteristics

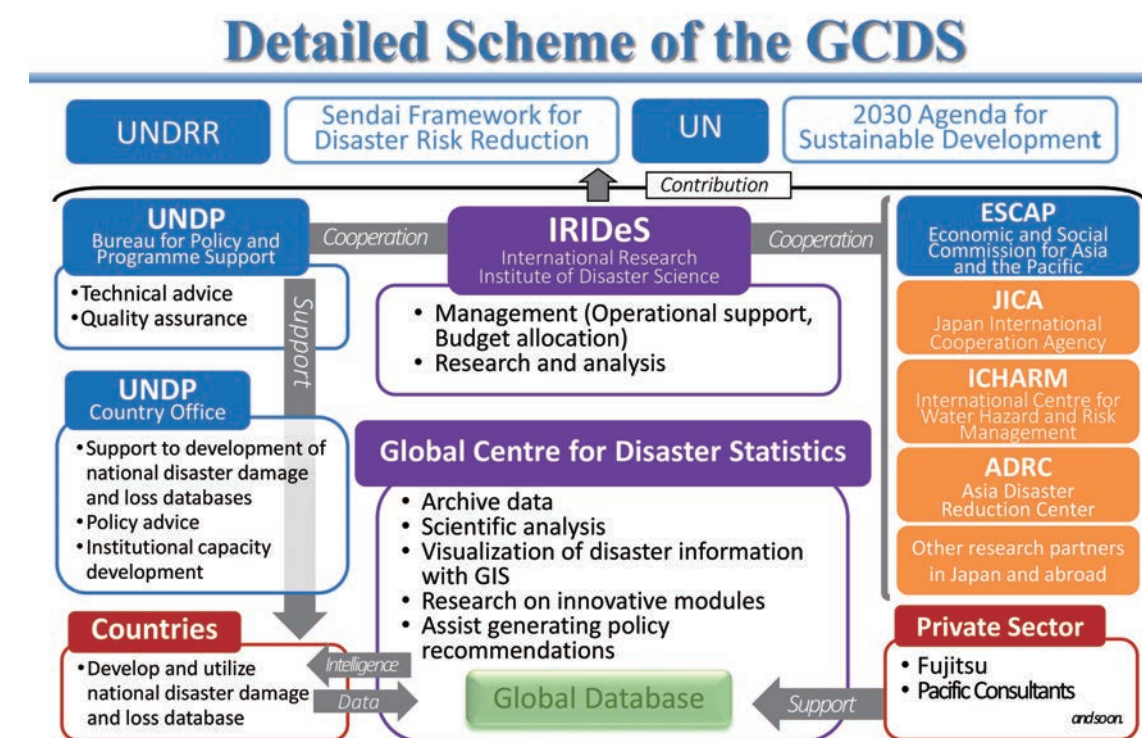
In fact, prior to the foundation of the GCDS, there were attempts to establish global disaster statistics. These data could not be effectively utilized for national DRR policy-making processes, however, for reasons such as that data were not from national governments and thus unofficial, that data lacked quality and quantity, or that their systems were unstable. On the contrary, the objective of the GCDS is to gather data from national governments comprehensively and systematically. In this sense, the role of this Centre is groundbreaking.

The GCDS gathers data from national governments and creates structures where the derived data can be utilized for DRR, through cooperation among Tohoku University IRIDeS, UNDP, and Fujitsu by employing the strengths of each party. Tohoku University IRIDeS, which includes DRR researchers from various fields, considers overall structures from data collection to its usage and is responsible for analyzing and studying the collected data. The UNDP assists national governance around the world and has strong networks with various countries; thus, it is at the forefront in promoting the establishment and collection of official national statistical data systems. Furthermore, with its own offices in developing countries, the UNDP trains

personnel for the establishment of disaster statistics by conducting projects for assistance and training in each country. Fujitsu has constructed a “global database” to store the collected disaster statistics and is contributing its advanced technical capabilities in information and communications technology.

By inserting the data from each country into the GCDS, the essential expertise to be utilized in DRR policy-making process is procured; it also contributes in paving the way to achieving the “global targets” that are the cornerstone of the SFDRR.

It has to be noted, however, that currently disaster statistics are not yet being comprehensively supplied on the database and the data cannot be used immediately. With the establishment of the Centre, an organizational basis for the global establishment and maintenance of official disaster statistics has been organized. When disaster statistics from many countries have finally been supplied, the GCDS will be able to demonstrate the power to contribute on a global scale, as its name implies. However, the first stage is to prepare a “repository” to store data as a prototype of a data collection system, targeting pilot countries. (Continued on page 5)



Structure of the Global Centre for Disaster Statistics

► Progress since establishment

The Centre has begun conducting activities in cooperation with several countries that are highly interested in establishing statistics. Currently, seven countries (Indonesia, Cambodia, Sri Lanka, Nepal, the Philippines, Myanmar, and the Maldives) have agreed to be pilot countries. Opportunities are being provided to confirm awareness of the establishment and maintenance of disaster statistics by holding a Disaster Statistics Symposium every year with officials of each country's DRR supervising department. Government officials become transferred and change every few years in each country, and thus such opportunities will be required regularly also in the future. Furthermore, in cooperation with Japan International Cooperation Agency, awareness-raising and

educational activities for disaster statistics are being included in DRR training in countries beyond the pilot countries.

At the same time, a global database, a core part of the Centre, has been constructed. Agreement has been obtained from the pilot countries with respect to the details regarding the data that should be collected and the method of data collection. Disaster statistics that existed prior to the establishment of the Centre are being converted to items that conform to the target indicators of the SFDRR, and efforts are being promoted to reuse such data, alongside the data that is collected specifically by the Centre. Through such means, formats are being prepared so that each country can report their progress to UN.

► About the future

The GCDS is a "powerful engine" for achieving the central targets of the SFDRR. Prof. Yuichi Ono, the Head of the Centre, says, "In order to create a situation for the storage and use of 'crops,' the Centre first began by 'plowing the field' and 'planting the seeds.'" It seems like this 'leveling of the land' is about 30% complete." In 2020, while continuing with awareness-raising activities in each country, holding symposiums with government officials, and constructing/strengthening databases, analyses will be initiated for usage of collected data. Specifically, economic assessments and calculations of DRR investment amounts will be conducted with respect to Indonesia. Necessary statistical data for this have already been accumulated in the GCDS.

The aims of the GCDS and the World Bosai Forum are ultimately the same, as both of them are to achieve the SFDRR targets. There is the difference, however, that the Centre has a top-down approach that involves "public assistance," while the Forum has a "bottom-up" approach that involves "self-help" and "cooperation." Prof. Ono says, "Already, both parties are cooperating, with the progress of the GCDS being announced at the World Bosai Forum, for example. We want to contribute to global DRR more, by promoting synergy through increased cooperation in the future."

Academic Exchange Between Tohoku, Japan and Aceh, Indonesia

Feature 3



IDReS hosted AIWEST

Japan and Indonesia share many features: geography, topography, and frequent natural disasters. Furthermore, both Tohoku, Japan and Aceh, Indonesia have been affected by a mega quake and tsunami. With a mission to pass on disaster lessons, IRIDeS is carrying out academic exchanges with various institutions around the world, including those in Aceh. IRIDeS has academic exchange agreements with the Faculty of Mathematics and Natural Sciences and the Tsunami Disaster Management Research Center (TDMRC) of Syiah Kuala University, and also with the Aceh Tsunami Museum.

Since 2005, Syiah Kuala University's TDMRC has hosted an academic conference called the *Aceh International Workshop and Expo on Sustainable Tsunami Disaster Recovery* (AIWEST-DR). On November 7 and 8, 2019, IRIDeS hosted the 12th AIWEST conference at Tohoku University, the first one held outside Indonesia. Keynote lectures were delivered to approx. 100 participants by the president of Syiah Kuala University and by Assoc. Prof. Yoshimi Nishi of Kyoto University, a leading researcher on Aceh. As well as the presentation of academic research papers, more than 70 participants took part in

a disaster education workshop and site visit to the 2011 tsunami affected areas. Taking this opportunity, the School of Engineering, Tohoku University and the Faculty of Engineering, Syiah Kuala University concluded a new academic exchange agreements on November 7, which was also supported by IRIDeS.

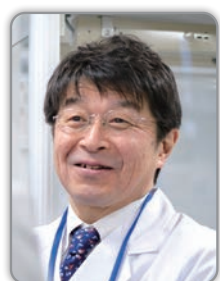
IRIDeS Director Fumihiko Imamura would like to foster academic exchanges with scholars and experts on DRR in Aceh and other disaster-prone regions and continue international collaborative efforts in disaster research and education.



IRIDeS researchers who organized the 12th AIWEST
(From left: Associate Professors Erick Mas, Anawat Suppasri, Sebastien Boret, and Elizabeth Maly)

Public Relations Office Column

What it means by "Ganbare (Do your best)"



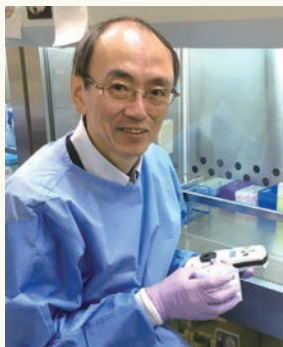
Head, Public Relations Office
Kiyoshi Ito
Deputy Director and Professor of IRIDeS

At last, the Olympic year 2020 has arrived. Japan will once again be filled with voices cheering and shouting "Ganbare, do your best!" in continuance of the emotional wave of last year's Rugby World Cup held in Japan.

Frankly, I am not much of a fan of that expression. Long ago, I was preparing for university entrance exams for another year after graduating from high school. Whenever my former high school classmates who had got admissions before me said to me, "Ganbare, do your best, study hard," I became a little unhappy, jealous, and envious, feeling "Yeah right. You are already enjoying your university life." Even now, some years later, I still cannot bring myself to say those words. Telling "Ganbare" to office staffs is also becoming a taboo in reaction to the reform of working practices, as the expression could be taken as power harassment. The world is changing, indeed.

It is actually very difficult to find words to express sympathy or encouragement. Last year, Japan suffered many natural disasters including Typhoon 19, and I heard news reporters often said, "Take care of yourself and *ganbatte kudasai* (hang in there)" to affected people. I felt something was not quite right about the expression but could not come up with any fitting alternative words myself. One day, while pondering on the issue, I recalled the words of a famous *enka* singer who was addressing people affected by the Great East Japan Earthquake: "You don't have to do your best anymore. You've done enough just making it through this disaster. It is us who will make every effort to do our best from this juncture." I remember I was very touched by it.

In the Public Relations Office, it is our job to provide accurate scientific information and knowledge in an easy-to-understand manner. No one will read an array of just toneless words, but how much emotion we should put in to the information depends on the context, standpoints of, and relationships between recipients and us, and thus is difficult. With you, we would like to keep considering how this institute specialized in disaster can convey disaster-related information and knowledge to society. We will do our best.



Disaster Medical Science Division
Professor Eiichi N. Kodama

➤ Infectious diseases as a disaster

Most people probably think of earthquakes and tsunamis when they hear the word “disaster.” However, “infectious diseases” wherein viruses and germs that enter the human body multiply and cause sickness can also be viewed as a disaster. For example, some infectious diseases are highly lethal, such as the Ebola virus disease that caused enormous damage in Africa and other places, and some types of bird flu. Depending on the scale of the outbreak, as with earthquakes and tsunamis, people may need to take refuge across a wide area. In the case wherein it is impossible to return until the end of decontamination, the situation is akin to that of a nuclear crisis.

➤ Infectious diseases research by Prof. Kodama and his engagement in the development of therapeutics for the leukemia virus

IRIDeS's Prof. Eiichi N. Kodama has been engaged in the research of various infectious diseases until now, including tuberculosis, HIV, measles, and the Epstein-Barr (EB) virus; however, among these, with respect to leukemia caused by the EB virus, Prof. Kodama has taken the lead in developing therapeutics for approximately 20 years. Prof. Kodama explains, “viral carcinogenesis is not dramatic like Ebola, but rather it is a silent outbreak that causes cancer while the infected person does not notice.” Patients suffering from leukemia caused by the EB virus exist not only in Japan but also throughout East Asia and Africa. The treatment of cancer caused by this virus is of great importance, and hence, Prof. Kodama has been engaged in the development of therapeutics for the EB virus. However, the road has not been smooth.

Prof. Kodama says, “In modern medicine, it is really, really difficult to design even one new drug.” The development of new medicines requires a huge number of personnel, countless trial and error, and massive research costs. It is not surprising that even pharmaceutical companies with hundreds of researchers cannot produce even a

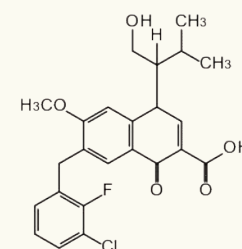
single new medicine per year. It is hard to imagine the difficulties of new drug development for a single researcher at a university who also has to undertake teaching, medical treatments as a doctor, and administrative duties. “You may imagine a situation that an individual researcher makes a proposal, ‘Listen, why don't we develop this type of new drug?’ and he or she meets with a favorable reaction from others, ‘That is a great idea. You can, and we will support you.’ But the reality is different. As to whether the research would produce results, and whether those results would lead to a treatment, in fact, the researcher himself or herself does not know the answer unless the research has been actually done.” However, this is true for all research. “Even in the case of IPS cells discovery by Prof. Shinya Yamanaka at Kyoto University, he was told at first that it would be impossible. Researchers need put aside the issue of whether the challenge actually leads to success. It will never be possible if you don't try.” Prof. Kodama began the development of EB virus-related leukemia therapeutics initially by acquiring small-scale research expenses.

Even at the initial phase of research, Prof. Kodama already felt a good response. When compounds that could control leukemia cells were actually discovered, he became convinced that the research would become successful. “But I was an unknown researcher at that time and had not built credibility yet,” Prof. Kodama says. As he gradually became known through academic societies and publications, however, requests for collaborative research began to come in from medical departments, pharmaceutical companies and other universities. “As I was offered various compounds from collaborators, the probability of finding a prospective treatment in line with my objectives increased exponentially. More researchers also declared their interest in joint research.” Prof. Kodama, in a joint research with Japan Tobacco, discovered an anti-HIV drug that can actually be administered to patients, leading to a second over-the-counter drug, which led to his greater achievements and trust. He finally acquired a major research grant from Japan Agency for Medical Research and Development (AMED) in 2016. Today, with a team of people, he is drawing close to the final stage of research.

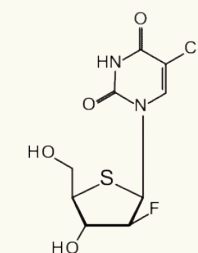
Today, human safety from EB virus-related leukemia therapeutics is being confirmed in animal experiments. However, Prof. Kodama points out that “there are many drugs that are terminated the development at this final stage since their unexpected adverse effects are found.” If the hurdle of animal experiments is overcome, and there are no issues in the clinical studies conducted thereafter, it will finally be approved as a new drug and will be put to actual use for treatment. Prof. Kodama is cautious until the end and states, “Even in that case, it is difficult to bring an end to cancer with just one new drug, and it will probably be used in combination with other drugs.”

From what Prof. Kodama says, current medical research is composed of huge, long-term projects, requiring teams with a large number of

Elvitegravir Successfully approved as a drug for HIV therapy



S-FMAU Developing as a drug for CAEBV*



*CAEBV : Chronic active Epstein-Barr virus infection. To date, there are no therapeutic agents.

Challenging for Health and Relief



people, and with roles distributed between members that are highly specialized so that medical research is cautiously moved forward while building up expertise. In this situation, the development of the study of leukemia therapeutics by Prof. Kodama is an incredibly rare case in which he began on his own and gradually won over trust and cooperation from others while taking the lead in the same study until the very end.

➤ The significance of infectious disease treatment in affected areas

Prof. Kodama's specialization is basic research; however, at the time of the 2011 Great East Japan Earthquake and the 2016 Kumamoto Earthquake, he went to the affected areas as an emergency medicine support doctor. Through those experiences, Prof. Kodama realized that the treatment of various infectious diseases is significant in terms of being a countermeasure for post-disaster infectious diseases among victims. At evacuation points wherein many people gather, the importance of infectious disease prevention is now being emphasized. Prof. Kodama, while working at disaster sites, has recognized that “it is not realistic to deal with infectious diseases only through preventative measures.” In affected areas, it is not easy to

take sufficient preventative measures such as wearing masks and ensuring water for handwashing, and, at evacuation points where there are no healthcare providers, it is not easy to newly prescribe vaccines that require careful temperature control. On the contrary, if infectious diseases are treated, it is possible to limit them at an early stage by easily prescribing such therapeutics when people become infected in affected areas. Infectious diseases require both prevention and treatment, and Prof. Kodama believes that the therapeutics of infectious diseases is, in fact, the key after the occurrence of a disaster.

➤ For the future

Smiling, Prof. Kodama says, “Originally, I was neither majoring in disasters nor infectious diseases. But while I was dealing with them as the need arose, they became my areas of expertise.” Currently, Prof. Kodama is also the Head of the IRIDeS Disaster Medical Science Division and has a coordinating role to facilitate collaboration between disaster medical research and other IRIDeS research. He would like to commit himself to train younger researchers in infectious diseases and to assist with the research on bacterial infectious diseases in the future.

➤ Introduction

In January 2019, a project was launched at IRIDeS, titled “Development of a supporting package for effective countermeasure planning against the *rinji jōhō* (special information)¹⁾ on the Nankai Trough earthquake.” The aim of this project is to contribute to the disaster risk reduction of the society by helping key players such as municipalities and enterprises so that society as a whole can act wisely. Supported by Secom Science and Technology Foundation, an interdisciplinary group composed of thirteen IRIDeS researchers, whose expertise include natural, social and human sciences, is leading this project.

➤ Special Information on the Nankai Trough Earthquake²⁾

The Nankai Trough earthquake refers to giant earthquakes of M8 class or larger along the plate interface that extends from the Suruga Bay to the Sea of Hyuga. Historically, such earthquakes have occurred approximately every 100–150 years. The probability of the next Nankai Trough earthquake occurrence in the next 30 years is estimated at 70–80%. Such an earthquake would cause extensive damages and impacts over a wide area due to the ground shaking and associated tsunami, and thus the earthquake is often described as a “national crisis.”

With our current knowledge, we cannot predict earthquakes. What we know about the Nankai Trough earthquakes instead is that there have been multiple cases of successive occurrence. For example, an earthquake occurred along the eastern portion of the plate interface in 1944, followed by another one along the western portion in 1946. Furthermore, the latest studies in earthquake science suggest that slow slips can trigger an earthquake, though not always. These findings imply that if some types of geophysical signatures were observed, we can consider that the probability of having a Nankai Trough earthquake has increased. Based on such an idea, a new information system has recently been adopted in Japan that, when the likelihood of a Nankai Trough earthquake has become higher than normal, the Japan Meteorological Agency will announce special information on the Nankai Trough earthquake.³⁾ There are two levels of information: a higher level alert (*keikai*) and a lower level alert (*chūi*). In 2019, the Cabinet of Japan announced guidelines for municipalities and companies in the anticipated disaster areas, who need to plan the countermeasures in response to the special information.⁴⁾

➤ The new project: How can we use uncertain disaster forecast information more effectively?

The government is pursuing disaster risk reduction, urging society to prepare for and react to a major earthquake before it occurs, through the new information system. However, such proactive countermeasures

based on uncertain disaster forecast information is a challenge with no precedent worldwide. Key organizations and the general public—those who receive and try to use this information—could be perplexed by the fact that a giant earthquake may strike but the chance of having one soon is much smaller than not having one.

To address this issue, the IRIDeS research group has decided to conduct an in-depth examination of the special information on the Nankai Trough earthquake from a variety of research fields. The research group thinks that providing a “second opinion” should be useful for the stakeholders to view the problem in different perspectives. The group also thinks that since the guidelines published by the Cabinet office are inevitably limited to general descriptions, providing more detailed and specific recommended solutions can complement the guidelines well. The research group is divided into three teams: the Hazard Assessment Team, the Countermeasures Team, and the Social Effects Team. The teams started examining the special information in each specialized field with inter-team discussions. The initial year of the whole research period of three years has just finished, focusing on Kochi Prefecture as a model area.

➤ About the future

The research group seeks to regularly share their provisional outputs with collaborating organizations, rather than presenting the final outputs at the end of the project period. An interim meeting was held in Kochi on February 19, 2020, where a range of useful discussion has taken place between the research group and the stakeholders in Kochi including Kochi prefectural government as well as other organizations. This interdisciplinary project may serve as a model for IRIDeS to conduct “practical research for disaster reduction.” Assoc. Prof. Yo Fukushima, the project’s principal investigator, remarks, “Multi-disciplinary (among different disciplines) and trans-disciplinary (academia and society) close collaborations are generally difficult. Through this project, however, I have become convinced that conscientious dialogues among different people can open up new possibilities. While aiming at practically useful results, we would like to pursue new approaches which can also promote advancement of each discipline.”

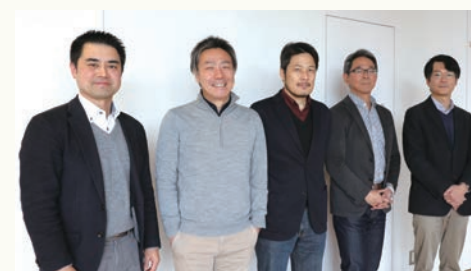
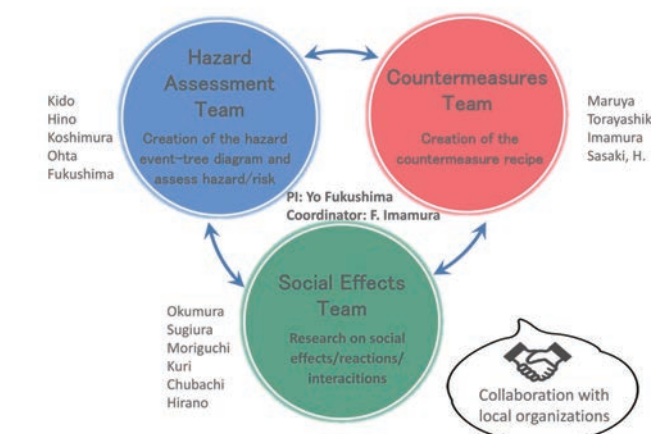
1) There seems no authorized English translation of *rinji jōhō* at this time. “Special information” is a tentative translation proposed by the project members.

2) The following is a concise explanation of this topic (in Japanese): Fukushima, Y. (2019), “Nankai torafu jishin rinji jōhō: okoru ‘kamoshirenai’ kyodai jishin e no taiō” [Special information on the Nankai Trough earthquake: responding to a mega earthquake that “might” happen], *Naifuru* no. 119, pp. 4–5, <https://www.zisin.jp/publications/pdf/nf-vol119.pdf>.

3) Kishōchō, “Nankai torafu jishin ni kanransuru jōhō no shurui to happyō jōken” [Types of information related to the Nankai Trough earthquake and conditions for their announcement], https://www.data.jma.go.jp/svd/eqev/data/nteq/info_criterion.html (accessed 01/20/2020).

4) Naikakufu (2019), “Nankai torafu jishin no tayōna hassei keitai ni sonaeta bōsai taiō kentō gaidorain dai ichi ban” [Disaster risk reduction response guidelines preparing for diverse possibilities of Nankai Trough earthquake occurrences: version 1] http://www.bousai.go.jp/jishin/nankai/pdf/honbun_guideline2.pdf.

Team structure



Primarily from the natural science and engineering perspectives, the **Hazard Assessment Team** aims at visualizing the diversity of scenarios that could happen after observation of a large earthquake or an anomalous slow slip, in which case the special information would be announced. Their research outcomes will facilitate the key organizations to overview the wide spectrum of possible scenarios and to better prepare. The team also plans to visualize the tsunami risk maps in the period of alert which is one or two weeks.



The **Countermeasures Team** will deliver recipes of recommended actions customized to different types of organizations so that they can create effective response plans in case of special information announcement. The team has been in collaboration with stakeholders in Kochi so that the recipes are effective in practical situations. They are currently focusing on the most challenging situation of a giant earthquake having struck on the farther side (that is, not much direct damage) and another one anticipated on the nearer side (which could cause tremendous damage). The team is seeking to promote the implementation of such recommendations through its integration with the general business continuity plans against Nankai Trough earthquakes. The team members are taking as important issues not covered by the government guidelines, such as sold-out stocks at local stores or traffic jams.



From engineering, neuroscience, and scientific communication perspectives, the **Social Effects Team** is exploring the interactions between the key organizations and society. The actions taken by the organizations have influence on society (other organizations and public) and the response of the society would inversely influence the actions of organizations. The team also focuses on the communication of the uncertain disaster risk information with the public. In the case of the Great East Japan Earthquake in 2011, gaps were observed between the public behavior anticipated by the key organizations and actual public behavior. Insights can be obtained from such past cases for wiser actions on the future Nankai Trough earthquakes. The final goal of the team is to explore realistic and effective actions of key organizations and effective communication with the public.

We Participated in the “Disaster Risk Reduction × Treasure Hunting Game”

On November 10, 2019, the forth “Disaster Risk Reduction × Treasure Hunting Game” was held by the Katahira community development association, cooperated by Prof. Takeshi Sato of IRIDeS. This event is both for children and adults, and also both for Japanese and non-Japanese residents, who would like to walk around the Katahira community of Sendai, learning about local disaster risks as well as its history and geography in the manner of a treasure hunting game. This article is a report written by a member of the IRIDeS Public Relations Office who participated in the event.

Disaster Information Management
and Public Collaboration Division
Professor **Takeshi Sato**



Start!

Our goal is to become ninjas for disaster risk reduction

At 9 a.m., 70 participants, including the organizers, gathered at Sendai International Center. Today we pretend that, “about 400 years ago, Lord Masamune Date founded ‘the crescent corps’ of ninjas who protect Sendai from natural disasters. Today, divided into small groups, we will hunt treasures hidden in Katahira, with a map and hints provided. We will get certified as new ninjas if we can find all secret codes written in hidden treasures and thereby can understand Lord Masamune’s secret order.” Participants had a kickoff ceremony, giving three cheers centering around the chief of the crescent corps (who is actually Mr. Hitoshi Konno, the head of Katahira community development association). Prof. Sato also encouraged everyone, saying, “Be careful about safety, and enjoy Katahira!”

I was in a group with seven international students residing in Katahira and studying automobile maintenance at the Kadan Automobile Collage. The students came from countries including Vietnam, the Philippines, and Sri Lanka. The students had a lifestyle different from that of the locals, spent their days in different locations, and barely had any opportunities to interact with the locals. However, with the cooperation of the College, the students were able to participate in this event, which also provided an opportunity to get to know their local community.

We deciphered the first code, together with two guides, Mr. Masahiro Horino from the Sendai Tourism, Convention and International Association, and Mr. Kazuhiko Nagato, the head of the Otamayashita Neighborhood Association. The first destination, *rojin ikoi-no-ie* (community center for elderly people), was specified and we departed for it.



Mr. Konno



Mr. Nagato explaining about the sluices.

Points along the way

It was a cloudless day in Sendai. The air was cool, but walking warmed us up. Ten minutes after we started out, we were walking along the Hirose River, when our guides stopped the group before a levee and sluice and explained: “This is one of many levees in Sendai. Usually, this sluice is open so that you can go down to the river beach. But when the water level is rising, this gets closed. This sluice was closed when Typhoon 19 arrived.” “When the typhoon of August 1950 struck, the Hirose River flooded, causing widespread damage. The water level at the time was the same height as the ground you are all standing on the road. This levee was built after that.” I was not aware of this fact beforehand.

The first destination point was also a district evacuation facility

After walking for another 10 minutes, we arrived at the first destination point, a community center for the elderly. We learned that the place is also a disaster evacuation facility that is opened and run by the Katahira community when necessary. Such disaster evacuation facilities run by local communities of Sendai contribute to avert overpopulation in disaster evacuation centers designated by the City of Sendai, and thus are considered as disaster reduction solutions developed progressively in Sendai.

We found the next code here: “A place for a bridge of the past, present, and future. The clue is in the past.” From this, we deduced that the next destination is Hyojogawara Bridge. The bridge was a 10-minute walk from where we were and is one of the bridges that span the meandering Hirose River.



District evacuation facility:
The first destination point

Learning about the geography and history of Sendai

When we got to the foot of the bridge, we looked in the direction indicated by our guides. We saw the ruins of an old bridge, just as the hint had mentioned. Here, we learned that constant flooding during the Edo and Meiji eras washed the Hyojogawara Bridge away, illustrating the river’s strength when the water levels rise.

“Now, the river beach that you all are standing on, and the street too, are so dangerous when there are heavy rains that they cannot be used,” our guides said. Both the guides grew up in Katahira and are well versed in the geography and history of the area. They gave detailed responses to our many questions about the region. They showed us landmarks such as where the banks of the Hirose River collapsed due to a past disaster and where a bomb shelter was once located.

We continued to decipher one code after another, advancing from one destination to the next, including the Katahiracho Elementary School which is an evacuation center designated by the city, Ryokakuincho Park which is another district evacuation facility, and Sendai City Museum, with our guides providing explanations along the way.



Hyojogawara Bridge



Ruins of an old bridge



Codes in the treasure chest

Finally certified as a ninja, realizing walking around the town is fun



Good job!

It was past noon when we returned to the starting point. All the clues gathered from the treasure chests at each location were assembled, and they read: “Report places of refuge from heavy rains to the chief.” This was the secret order of Lord Masamune, and it was about the evacuation places we visited on our walk today. We reported the results to the chief, and everyone was certified as a ninja for disaster risk reduction.

I asked other participants about their impressions. Mr. Gonzales Yancy Dionet Pille from the Philippines said, “Solving the riddles was fun.” Mr. Nguyen Tien Tam from Vietnam said, “I have lived nearby but didn’t know about this area. It was interesting to learn about the differences in the town between the past and present.” I also began to see Sendai differently, after I walked around the town helped by the guides. After the event, I bought historical maps of Sendai and often enjoy walking by myself, exploring changes over the years of Sendai.

Review

Comments of Prof. Takeshi Sato

The event “Disaster Risk Reduction × Treasure Hunting Game” aims at learning about disaster risk reduction, with a feature that even children can enjoy through treasure hunts. The event was held for the first time in the fiscal year of 2016, as a model project of the District Disaster Management Plan of the Cabinet Office. The event continued as a voluntary activity of the Katahira community afterwards. Prof. Sato says, “There is no community that is capable only of disaster risk reduction. Disaster risk reduction has to be positioned as one of the community building activities. In addition, if only adults are involved, at some point those activities will reach a dead end. Some of the guides of “Disaster Risk Reduction × Treasure Hunting Game” this time are high school students who used to join the event as elementary school children. Before they joined the event to learn, but now they are ones who teach others. A new generation has been fostered. This event is one of the community building activities of Katahira, bringing up the next generation of the community.”

Also, an international population has participated in this event since its first time. One of background reasons is that during the Great East Japan Earthquake, many international residents evacuated to Katahiracho Elementary School, a designated evacuation center by the city, which made operation of the center very difficult. Having learned from these lessons, the Katahira community development association started making efforts to have interactions with the international residents at normal times to get to know each other, encouraging them to have disaster risk reduction knowledge. Prof. Sato and other IRIDeS members have supported such community efforts. Prof. Sato has also worked on bridging the Katahira community and Tohoku University in the context of disaster risk reduction. He urged University House Katahira of Tohoku University to become an evacuation facility.

Prof. Sato says, “Through ‘Disaster Risk Reduction × Treasure Hunting Game,’ people of different age groups and nationalities can get together and learn nature, history and disaster risk reduction in a fun and comprehensive manner. This event can become a role model for other places. One of the pertinent issues in the society today is how to make activities of Voluntary Disaster Risk Reduction Organizations (*Jishu Bosai Soshiki*) more active, since many of those organizations are dependent on government supports. I would like to keep working on increasing local communities like Katahira that conducts independent and sustainable disaster risk reduction activities.

* The following paper discusses “Disaster Risk Reduction × Treasure Hunting Game”:

Sato, T. et al. (2018) “Sustainable community development for disaster resilience and human resources development for disaster risk reduction: Katahira-style disaster resilient community development,” *Journal of Disaster Research*, 13-7, pp.1288-1297.

Activities

Activity 01

New Endowed Research Division Established in IRIDeS

In November 2019, IRIDeS launched the new *Earthquake Disaster Prevention for Urban Areas (OYO Corporation) Endowed Research Division*. This new division is headed by Prof. Shinji Toda (concurrently working at the Disaster Science Division) and includes Research Associates Yoko Yoshimi and Kimie Norimatsu. The new Division aims at studying major inland earthquakes in urban areas and proposing realistic disaster risk reduction measures.

On November 6, 2019, the inaugural ceremony for this new division was held, and the specific research policy was explained. The Division plans to conduct detailed case studies and construct a database of inland earthquakes that have occurred in Japan and overseas. Further, the division will focus on a possible future earthquake by the Nagamachi-Rifu active fault zone which could occur right beneath Sendai's urban area in the near future, estimating their earthquake ground motions and damages. At the establishment of the new division, Prof. Toda stated his ambitions by saying, "Many of the major urban areas in Japan are on or near active faults, and are highly exposed to the risk of earthquakes. We will develop new forecasting technologies, learning from the lessons of major urban area earthquakes such as the 1995 Great Hanshin-Awaji Earthquake and 2016 Kumamoto Earthquake. We would like to produce research outcomes that could have a strong impact on society, supported by OYO Corporation and taking advantage of industry-academia cooperation."



At the ceremony

Activity 02

Integrating Arts and Sciences by Regularly Holding Symposiums

Human and Social Response Research Division
Associate Professor **Yuichi Ebina**



Natural disaster has many aspects to consider, and it is important that researchers from various specialized fields cooperate to conduct disaster studies. As the prerequisites and techniques vary on the basis of the field of specialization, however, it is not easy to conduct interdisciplinary research, particularly in the case of research that integrates both humanities and sciences.

Since 2017, IRIDeS Assoc. Prof. Yuichi Ebina who is specialized in modern history of Japan and historical disaster research has been in charge of planning and managing an annual symposium that coordinates arts and sciences. The Third Symposium, "New Developments in Disaster Science from Historical Lessons III: Japanese disaster culture," was held open to the public on July 21, 2019, jointly by IRIDeS and the Inter-University Network Project on Preservation of Historical and Cultural Resources Tohoku University Base. During the Symposium, the keynote speech was given by Prof. Emeritus Nobuo Shuto from Tohoku University, who is a pioneering researcher in the field of tsunami engineering, and panel discussions on disaster culture were developed among researchers both from the arts and sciences, including Assoc. Prof. Ebina and other historians and engineers. The Symposium was a great success with 136 participants.



Panel discussion of the Symposium

Regarding the Symposiums, Assoc. Prof. Ebina said, "Each time, we are opening up possibilities in new fields and sensing a great response. There is also increasing participation from outside IRIDeS. On the one hand, differences among different areas of expertise are becoming clearer. For example, researchers of the arts and sciences could interpret the same data differently from each other." Assoc. Prof. Ebina highlighted that it is important to develop research through discussions held between researchers from different standpoints.

After the Great East Japan Earthquake, digitizing historical materials is advancing, and activities to preserve historical materials are being developed through cooperation between organizations and regions. Valuable information from the past, including regional disaster records, is being made accessible to be used in research nationwide. Much information from historical materials is still left unused, however, since specialized training is necessary to explain historical materials. Assoc. Prof. Ebina stated his ambitions by saying, "From now on, in the process of promoting study that integrates the arts and sciences, if we are able to effectively incorporate information from historical materials, we can expect to see the rapid development of disaster research. By continuing to hold symposiums, and through daily research, we are pursuing the path to the integration of the arts and sciences."

Activity 03

Cooperation in Awareness Activities Regarding Assistance Dogs during Disaster Prevention

Disaster Medical Science Division
Lecturer **Yasuhiro Miki**



"Assistance dog" is a general term for guide dogs, hearing dogs and mobility-service dogs that have received special training to aid social participation of people with visual and other physical disabilities. When assistance dog users evacuate due to a disaster, their dogs evacuate with them.

Dr. Yasuhiro Miki, Lecturer of IRIDeS, specializes in the basic research of Disaster Medicine. He is also a veterinarian who has been considering issues related to assistance dogs during disaster evacuation. During the 1995 Great Hanshin-Awaji Earthquake, it was not officially approved that assistance dogs stay at disaster evacuation centers, but it is now obligatory to accept the "joint evacuation" of assistance dogs and their users at evacuation centers, on the basis of the Act on Assistance Dogs for Physically Disabled Persons enacted in 2002. Since then, it has become a principle that assistance dogs stay with and assist their users even at evacuation centers.

"The issue is that this law is not yet widely known to the public, however," says Dr. Miki. Not only during disaster evacuation but also at normal times, it is obligatory to accept assistance dogs in common areas, but there have been reports that assistance dogs were not allowed to enter places such as restaurants and hospitals. If an assistance dog is refused to enter a disaster evacuation center, it could become a matter of life or death for the user. Thus Dr. Miki considers that it is important to coordinate and raise awareness among stakeholders at ordinary times. He has been working with the Japanese Service Dog Resource Center to exchange opinions and share the current issues and has also made presentations on assistance dogs and disaster evacuation for other IRIDeS researchers. Dr. Miki says, "Evacuation center manuals of many municipalities still do not stipulate the obligation to accept assistance dogs. One of the effective ways to expand the understanding of assistance dogs should be that those manuals state the obligation."

Actually, however, there is a small number of troubles caused by misunderstanding of assistance dogs, as there are only approx. 1,000 assistance dogs in Japan. On the contrary, issues related to pets during disaster evacuation are more common and have attracted social attention, as their numbers are much greater than ones of assistance dogs. "At the time of the Great East Japan Earthquake, many pet-related problems occurred, and the Ministry of the Environment formulated new guidelines afterwards. Today's principle is that owners should bring their pets to evacuation centers together, because if pets are left behind at home, it could lead a more serious result. However, it is important that living spaces of humans and pets basically need to be separated at evacuation centers." If humans and pets stay in the same space at a crowded evacuation center, issues such as allergies and infectious diseases may arise. Pets are different from assistant dogs in that only the latter is required by law to be with their users in the same space at an evacuation center.

Laws and guidelines regarding how to treat assistance dogs and pets during disasters have been developed recently. However, lack of social awareness still prevails. There were also misunderstandings and confusions regarding pets and evacuation during the time of the 2019 Typhoon 19. Overall, Dr. Miki views that the society is moving toward the direction that humans and animals can coexist even during disaster, but he would like to continue his efforts to understand the latest situation and to raise awareness regarding assistance dogs and pets during disaster.



From left: Guide dog, hearing dog, and mobility-service dog
(Photo by courtesy of Japanese Service Dog Resource Center)