TOHOKU
UNIVERSITY

Annual Report 2023

Tohoku Forum for Creativity

Message from the President:

In Issuing the Annual Report

Since its establishment in 1907, Tohoku University has followed its tradition of 'Research First', its philosophy of 'Open Doors', and its ethos of 'Practice-Oriented Research and Education', all of which have enabled it to produce leading figures and numerous research achievements.

In 2024, Tohoku University became the first institution in Japan to meet the requirements for accreditation as a University for International Research Excellence. Tohoku University humbly accepts the great honor and responsibility of being a leading research university in Japan. I believe that what is required of us is to create world-class knowledge and drive transformative change that will lead us to the future. Through our activities, we will support students and young researchers, helping them achieve their goals and cultivating their talents so that they may be active on the world stage.

Thanks to the efforts of many people, the university's Tohoku Forum for Creativity (TFC) was established in 2013 as the first international visitor research institute in Japan. The TFC facilitates interdisciplinary research with international collaborators, fosters young global leaders, and creates new research fields. In order to identify important issues across the sciences and humanities, the TFC runs programs that bring together junior and senior researchers in a stimulating environment and promote creative approaches to new, interdisciplinary research areas. Through these programs, the TFC provides a place for young researchers and students to interact directly with world-class researchers, including Nobel Prize winners, and engage in exchanges about research results. In this way, the TFC helps play a major role in strengthening the university's research capabilities, in building international networks, and in nurturing talented, globally oriented individuals who can contribute to solving the common issues our society faces. The TFC also strives to disseminate knowledge widely and expand the scope of its audience by holding academic events for the general public where they too can interact with leading researchers. Through the TFC, we are working to solve common issues and implement research results for the good of society through collaborative programs with various actors such as companies, local governments, individual citizens, as well as other international industry-academia actors.

On behalf of the university, I would like to express my deepest gratitude for the tremendous support the TFC has received so far and ask for your continued support for the TFC and its activities.

Tohoku University President
Teiji Tominaga

Message from the Director:

Toward the Promotion of the Tohoku Forum for Creativity

The Tohoku Forum for Creativity (TFC) aims to foster research exchanges among diverse researchers to generate new knowledge. Since its inception in 2013, the TFC has acted as the coordinating center for various projects focused on internationalization. The Thematic Programs (TP) under this framework invite leading researchers to Tohoku University for one to three months. These programs strive to involve researchers of all levels and backgrounds to form a diverse intellectual network, exploring specific themes from innovative and multi-angle perspectives. Through the Junior Research Programs (JRP), we offer emerging researchers the chance to spearhead future research fields. Additionally, since FY2022, we have initiated the Future Society Design Programs (FSDP), which provide platforms for discussing societal and industrial challenges.

Following the COVID-19 pandemic, from 2022 onwards, the programs have resumed as in-person events. In FY2022, we conducted five TPs, two JRPs, and two FSDPs, followed by one TP, one JRP, and five FSDPs in FY2023. This year, we plan to hold two TPs, one JRP, and five FSDPs.

Numerous success stories have emerged from the TFC programs. A standout example is the Thematic Program "Integrated Understanding of Marine Environment and Marine Ecosystems" in FY2023. Its accomplishments led to the establishment of a new WPI (World Premier International Research Center Initiative), the Advanced Institute for Marine Ecosystem Change (WPI-AIMEC) in 2023, achieved through a partnership between Tohoku University and JAMSTEC.

In 2023, we launched the Design Lab for our Future Co-existence, a restructured version of the Design Hub for our Future Society, which operated from 2020 to 2022. The Design Lab, TFC facilitates the creation of social value through collaborations with various stakeholders, including companies, local governments, and citizens. It promotes the development of young talent through cooperative activities.

In 2024, Tohoku University became the first institution in Japan to meet the requirements for accreditation as a University for International Research Excellence. This prestigious recognition highlights the university's dedication to advancing global research and its leadership in fostering international academic collaborations. We appreciate your support for our activities and kindly request your continued cooperation and assistance.

Tohoku Forum for Creativity Director
Tohoku University Executive Vice President (for Research)
Asako Sugimoto

Overview of the Tohoku Forum for Creativity

Since its foundation, Tohoku University has produced numerous academic achievements and leaders under the spirit of Research First, the philosophy of Open Doors, and the policy of Practice-Oriented Research and Education. To further develop this unique tradition, the university strives to contribute to global society and nurture creative talent under the slogans "Creation on the Leading Edge" and "Challenge for Great Changes." In this vein, the Tohoku Forum for Creativity (TFC) was established in 2013.

Mission

The TFC supports the creation of new knowledge that can improve the future of our societies. To produce new knowledge, it is necessary to prepare opportunities for collaboration in which various researchers can interact, as well as to cultivate emerging talent who can demonstrate their creativity in cooperation with others. Furthermore, to produce knowledge that benefits society, it is indispensable to collaborate and communicate with different stakeholders such as companies, local governments, and citizens. Moreover, we cannot ignore the importance of an environment that fosters creative research activities, because academic research is now becoming more and more inseparable from data utilization. Thus the TFC pursues the following missions:

- **Encourage international collaboration**
- **Facilitate interdisciplinary research**
- **Raise global leaders**

These missions are mutually related. The TFC supports the creation of new research fields and the solution of social issues by providing opportunities for researchers to collaborate internationally in tackling the increasingly advanced and complex issues facing society. These issues are only tackled by various interdisciplinary approaches, and these approaches are expected to bring new fields of research activities. In the course of these research the TFC cultivates global and creative talent by promoting the participation of young researchers and students in our programs, and fostering an environment in which they can interact closely with world-class researchers. The TFC also promotes the sharing of knowledge by providing opportunities for intellectual exchange between researchers and the general public, including the children who will lead society in the future, through the planning and hosting of public events.

TFC's Projects and Organizations

The "Forum for Creativity" Project

The TFC was established in 2013 as Japan's first organization with a research center for international visitors. Since then, it has run the Forum for Creativity project as its primary task. Its objective is to contribute to solving the major issues faced by humanity and support the creation of new research fields by providing opportunities for researchers to tackle issues collaboratively. For this purpose, our organization calls for thematic programs from throughout the world, covering all academic domains, from humanities and social sciences to natural sciences and engineering. The TFC then selects themes for concentrated discussions over a three-month period, for which it invites leading international researchers and hosts international symposia or workshops. It is also actively engaged in the cultivation of global and creative talent by promoting the participation of young researchers and students in its programs. Junior Research Programs, in which young researchers exercise their initiative for creating new research fields, are hosted every year. Additionally, since FY2022 the TFC has been operating Future Society Design Programs which focuses on discussing issues faced by society and industries.

Design Lab for our Future Co-existence

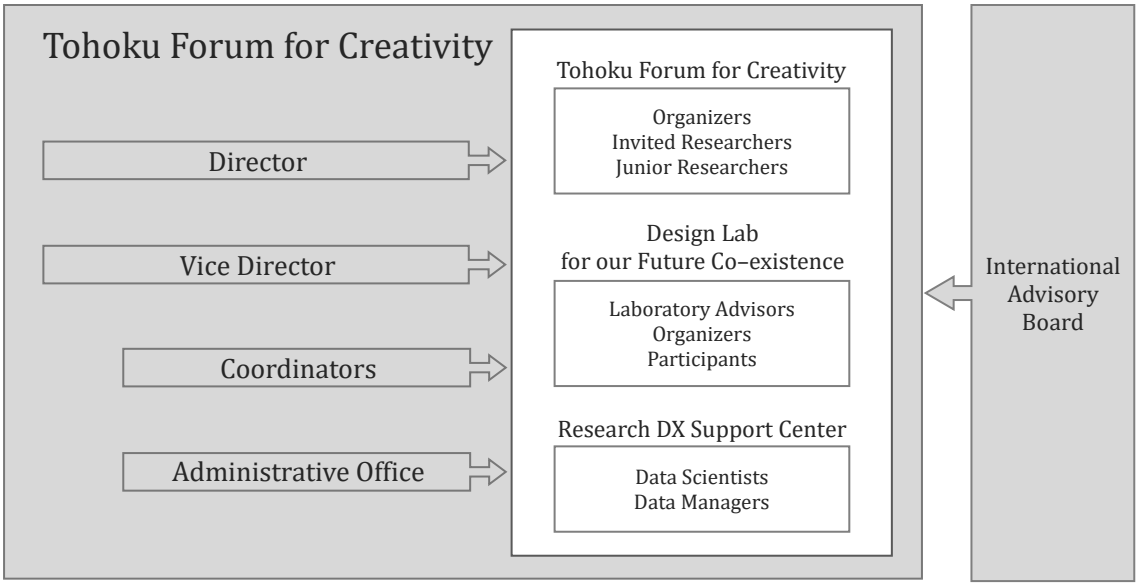
The TFC supports social value creation in collaboration with various stakeholders such as companies, local governments, and citizens, and the cultivation of young talent through collaborative activities. To assume this role, the Design Hub for our Future Society was established within the TFC in November 2020. Some collaborative programs involving business partners are already underway.

In April 2023, the Design Lab for our Future Co-existence was established as the Design Hub's successor, working to discover specific issues that need to be resolved in contemporary society from the perspectives of "co-existence with humans," "co-existence with nature," and "co-existence with technology," utilizing both cyber and physical space.

Research DX Support Center

The TFC supports the promotion of digital transformation (DX) to organize an information environment that facilitates creative research, as research activities become more and more inseparable from data utilization. To perform this role, the Research DX Support Center was established within the TFC in November 2020. The Center supports the promotion of DX through surveying the situation in Japan and the world, as well as through information-sharing activities such as seminars.

Here is the organizational structure of TFC designed to achieve these missions.



Tohoku Forum for Creativity, Organization for Research Promotion, Tohoku University

Tohoku Forum for Creativity Programs

- Thematic Programs
- Junior Research Programs
- Future Society Design Programs
- Emerging Perspectives Programs
- Outreach Events

Design Lab for our Future Co-existence

co-existence with humans : co-existence with nature : co-existence with technology

- Global Academy-Industry Collaboration and Fostering of Young Generation
- Future Society Design School from the Viewpoint of ELSI
- Academy-Industry Collaboration Program
- Forum for Innovative Social Design considering Society 5.0
- Academy-Industry-Government Collaboration for Open Innovation

Research DX Support Center

- Advanced Research DX Environment
- DX Support by Data Scientists / Data Managers

Advisors

Special Advisors

The TFC has invited two world leaders in business and academia to provide comprehensive advice about the activities of the TFC.

Tetsuro Higashi	Former CEO Tokyo Electron Limited
Makoto Kobayashi	Honorary Professor Emeritus High Energy Accelerator Research Organization

International Advisory Board

The International Advisory Board was established as an organization to evaluate the proposed thematic programs gathered from throughout the world, and to provide advice on the activities of the TFC.

Sayaka Dake	Professor Graduate School of Law, Tohoku University
Arjen Doelman	Professor Mathematical Institute, Leiden University
Yuko Harayama	Emeritus Professor Tohoku University
Mathias Kläui	Professor Institute of Physics, Johannes Gutenberg-University Mainz
Toru Nakano	Emeritus Professor Osaka University
Hirosi Ooguri	Fred Kavli Professor and Director of the Walter Burke Institute for Theoretical Physics California Institute of Technology
Huey-Jen Jenny Su	President Emeritus Distinguished Professor, Department of Environmental and Occupational Health National Cheng Kung University
Katsuya Yamori	Professor Research Center for Disaster Reduction Systems, Disaster Prevention Research Institute, Kyoto University

Message from our Sponsor:

For the Development of a Dream-filled Society

In recent years, digital devices such as PCs and smartphones as well as networks, have made remarkable advancements in society, enabling us to utilize various internet and platform services. Through these services, data accumulation is progressing, and it is predicted that applications requiring large-scale calculations, such as AI, autonomous driving, and virtual reality, will become technology drivers in the future. At the core of the evolution of these digital technologies lies semiconductors. The expectations for technological innovation in semiconductors are endless, including further advancements in capacity, speed, reliability, and low power consumption. The semiconductor manufacturing equipment market in which Tokyo Electron (TEL) participates is expected to continue expanding along with the development of the semiconductor market.

TEL set a new vision of being "a company filled with dreams and vitality that contributes to technological innovation in semiconductors" on the occasion of celebrating our 60th anniversary last year. Leveraging our expertise, we aim to expand long-term profits and continuously improve corporate value by continuously creating high value-added cutting-edge equipment and technical services.

As a collaborative project with Tohoku University, we have long been promoting exchanges in the field of semiconductors in terms of personnel and technology. We also deeply appreciate the significance of Tohoku University's full-fledged visitor research program, "Tohoku Forum for Creativity (TFC)," which was the first of its kind introduced by a Japanese university. TEL has been providing support for this program since its establishment in 2013.

TFC brings together world-class researchers, including Nobel Prize and Fields Medal winners, and advances various research fields with the aim of achieving a sustainable society. By leveraging the partnership with TFC and combining the diversity of perspectives and high-level academic expertise with the resources that our company possesses as a corporation, we aim to create new value and contribute to the realization of our vision. Furthermore, through this program, we also hope to contribute to the development of individuals who can think from a global perspective by creating opportunities for young researchers who will lead future research.

We hope that TFC will continue to serve as a gathering place for highly influential world-class intellects and make a significant contribution to the development of a society full of dreams.

Tokyo Electron Limited,
Representative Director, President & CEO
Toshiki Kawai

TOKYO ELECTRON House of Creativity

Construction was completed on the TOKYO ELECTRON House of Creativity in March 2015 at the Tohoku University Katahira Campus, to serve as the center for the TFC. The TFC aims to use this center as the principle location for the realization of "building a community of wisdom where people gather together, learn, and create, with an open doors to the world."
*Tokyo Electron Limited provided immeasurable support for the construction of this facility.








Thematic Program | October 2023 – December 2023

Integrated Understanding of Marine Environment and Marine Ecosystems









Thematic Program | October 2023 – December 2023

Integrated Understanding of Marine Environment and Marine Ecosystems

There is a widely recognized need to deepen our understanding of the rapidly changing marine environment and ecosystems through interdisciplinary research. The themes of this program are an integrated understanding of the physical, biogeochemical, and biological environments of the ocean, which have been studied as separate disciplines; an understanding of the global marine ecosystems that are supported by these environments; and an understanding of the mechanisms of change in these ecosystems in future environments. This program provided a forum for discussion on how to advance interdisciplinary research while utilizing the latest research methods and new data through the implementation of the following events.

(1) International Symposium "Past, Present, and Future of Marine Environments and Ecosystems" (October 18, 2023 - October 20, 2023)
(2) Lecture Series on Marine Environment and Ecosystems
Lecture 1: The ocean carbon cycle: Blooms, remineralization and deep ocean oxygen
Lecture 2: Iron in the ocean: A history of discovery and potential future applications
Lecture 3: BGC–Argo investigations of Southern Ocean biogeochemistry
(November 27-November 29, 2023)
(3) International Workshop "Pathways Toward an Integrated Understanding of the Marine Environment and Marine Ecosystems" (December 5 - 6, 2023)
(4) Public Lecture "New Technologies for Ocean and Climate Research" (December 13, 2023)

Important Goals and Degree of Achievement

In order to promote innovative interdisciplinary research on the marine environment and marine ecosystems, the program had the following three key objectives to contribute to the establishment of research collaborations and the initiation of several specific research projects.
(a) Establish a framework for research collaboration that integrates understanding of the physical, biogeochemical, and biological aspects of the marine environment.
(b) Promote environmental DNA (eDNA) analysis to study the whole picture of marine ecosystems and the mechanisms of their change.
(c) Present possibilities for interdisciplinary research on sustainable use of marine ecosystems and assessment of the impact of human activities on the environment and ecosystems.

Regarding Objective (a), through holding international symposiums and workshops, including discussions at the preparatory stage, we were able to establish a research collaboration network with Tohoku University, Okinawa Institute of Science and Technology Graduate University, JAMSTEC, Hirosaki University, University of the Ryukyus, University of the Philippines, and Diponegoro University (Indonesia). Regarding objective (b), information sharing and discussions at a series of events have deepened understanding of the possibilities and limitations of environmental DNA analysis, and have laid the groundwork for future research promotion. Based on the extensive lectures, talks, and group discussions related to objective (c), we were able to establish a working team that will continue to work toward achieving this objective after the program period.

Program Organizers

Toshio Suga (Professor, Graduate School of Science, Tohoku University)
Doctor of Science (March, 1991, Tohoku University).
Specializing in physical oceanography, he received the Oceanographic Society of Japan Award

in 2017 for "Observational Studies on the Formation, Movement, and Transformation of Surface Water Masses in the Pacific Ocean." His main publications include "Ocean Warming: The Changing Ocean and the Impact of Human Activities" (co-authored, Asakura Shoten, 2017).

Toyonobu Fujii (Associate Professor, Graduate School of Agricultural Science, Tohoku University)
Ph.D. in Environmental Management (July, 2007, University of York, UK)
He specializes in marine ecology, community ecology, and environmental dynamics analysis, and served as Guest Associate Editor (Lead) of Frontier in Marine Science from 2017-2020 and 2021 to present.

Michio Kondoh (Professor, Graduate School of Life Sciences, Tohoku University)
Ph.D. (Science) (March, 1998, Kyoto University)
Specialized in theoretical ecology and community ecology, he received the Young Scientists' Prize of the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology in 2013. For 2018-2022, he is the president (first president) of the Environmental DNA Society. His major publications include "Environmental DNA : Deciphering the True Nature of Ecosystems" (co-authored, Kyoritsu Shuppan, 2021).

Nicholas M. Luscombe (Professor/Dean of Research, Okinawa Institute of Science and Technology Graduate University)
Ph.D. in Structural Biology (2000, University College London, UK)
He specializes in computational biology, genetics, genomics, genes, and cell biology, and serves as a member of the European Molecular Biology Organization (EMBO) since 2013. He is the author of “A Handbook of Transcription Factors” (co-author, Springer, 2013).

Ulf Dieckmann (Professor, Okinawa Institute of Science and Technology Graduate University)
Ph.D. in Theoretical Biology (1997, Leiden University, The Netherlands)
He specializes in complex systems, ecology, and evolutionary biology. He is the author of “Adaptive Speciation (Cambridge Studies in Adaptive Dynamics, Series Number 3)” (editor, Cambridge University Press, 2004).

Michio Kawamiya (Director, Research Center for Environmental Modeling and Application, JAMSTEC)
Ph. D. (Science) (Sep, 1997, University of Tokyo)
Specializing in Earth System Modeling, he received the Environmental Science Award (Oceanographic Society of Japan) in 2020 for his "promotion of global warming prediction research and public awareness activities to the general public.” His main publications include "Simulate the earth : Earth science to predict the future = Simulate the earth" (sole author, Bele Publishing, 2018).

Sayaka Yasunaka (Professor, Graduate School of Science, Tohoku University)
Ph.D. (Science) (Mar, 2005, Tohoku University)
She specializes in marine environmental science and marine material cycles, and was awarded the Environmental Science Prize by the Oceanographic Society of Japan in 2023 for "promotion of research on global-scale ocean environmental change, as well as awareness-raising and social activities. She is a member of the WCRP/CLIVAR Pacific Regional Panel since 2023.

Jamie Kass (Associate Professor, Graduate School of Life Sciences, Tohoku University)
Ph.D. in Biology (February, 2019, City University of New York, USA)
He specializes in biogeography, community ecology, conservation ecology, and statistical modeling, and received the Ecological Society of Japan Incentive Award (Suzuki Prize) in 2022

for his outstanding work on statistical evaluation of the effects of interspecific interactions on species distributions.

Highlights of Program

(i) Successes and Reflections

The international symposium (event #1), which included lectures and poster presentations that provided an overview of the current status and challenges of research on the marine environment and marine ecosystems, promoted the exchange of the latest knowledge among disciplines, and presented cross-disciplinary perspectives, and a panel discussion on how to address the issues raised in the lectures. These were generally successful. In addition, the excursion to the Onagawa Field Center of the Graduate School of Agricultural Science, Tohoku University, where participants toured the Center's facilities and experienced a mini cruise in Onagawa Bay, was said to have provided an opportunity to deepen friendship among the participants and to develop an image of future interdisciplinary collaborative research.
The international workshop (event #3), we succeeded in encouraging active participation of young researchers and students by having an icebreaker session that felt like a game, by having more lectures by young researchers and students, and by setting up longer discussions in small groups of young researchers and students (with senior researchers as mentors). This was successful in encouraging the active participation of young researchers and students. The theme of the discussion, "Pathways to an Integrated Understanding of the Marine Environment and Marine Ecosystems," was discussed in a general discussion at the end of the workshop, with each group reporting on their discussions. Although generally successful, the workshop would have been even more effective if participants had been given more detailed information about the discussion topic and working format in advance.

(ii) Domestic and international media coverage

There was no direct media coverage of this program.

Principal Invited Researchers

Åke Brännström (Professor, Umeå University, Sweden)
His research focuses on the development and analysis of mathematical models and methods, focusing on the complex dynamics that occur over various time scales, including rapid individual changes, slow demographic changes, and even slower evolutionary changes in rich biota and complex human societies.

Ulf Dieckmann (Professor, Okinawa Institute of Science and Technology Graduate University)
His research interests include ecological evolutionary dynamics, adaptive dynamics theory, speciation theory, food web dynamics, spatial ecology, life history theory, fisheries management, fishery induced evolution, cooperative evolution, common good management, disease evolution, network dynamics, and systemic risk.

Keith Rodgers (Senior Researcher, IBS Center for Climate Physics, Korea)
Focusing on the role of the ocean in the climate system and the impact of climate change on oceanic material cycles, he has clarified the quantitative understanding of ocean circulation and water mass formation and the depiction of carbon and nutrient cycles through the analysis of ocean general circulation models and material circulation models.

Peter Strutton (Professor, University of Tasmania)
His research focuses on the interactions of physical and biological processes in the ocean and their effects on ocean productivity and CO2 exchange between the atmosphere and ocean, primarily in the Southern Ocean. He is one of the two ocean editor of Geophysical Research Letters.

Specific Strategies for International Research Exchange

(i) International Research Exchange Goals and Level of Achievement

By utilizing the international networks established by Tohoku University's Graduate Schools of Science, Life Sciences, and Agricultural Sciences, Okinawa Institute of Science and Technology, and the Japan Agency for Marine-Earth Science and Technology in the fields of marine environment and marine ecosystems, and by bringing together participants in international symposia and workshops from a wide range of fields in marine physics, biogeochemistry, biology, and ecology, we aimed to build a cross-disciplinary international research network that crosses the networks of each institution. We have largely achieved this goal.

(ii) New knowledge gained through invited researchers

Many pieces of new knowledge useful for promoting innovative interdisciplinary research on the marine environment and marine ecosystems have been provided by the invited researchers. For example, the methodology and findings of integrated research linking eco-evolutionary dynamics, adaptive dynamics theory, food web dynamics, and fisheries management, and the latest analysis methods and findings of data from automated observation devices (profiling floats) equipped with biogeochemical sensors..

(iii) Possibility of joint research, joint papers, etc.

The work of compiling the content discussed through this program into a report or perspective paper is being continued after the program period by volunteer mentors of senior researchers and volunteers of young researchers and students. The results of this work may result in some kind of peer-reviewed publication.

(iv) Specific achievements of note regarding research exchange

Cross-disciplinary and cross-institutional discussions in preparation for this program were utilized in the application of the "Institute for Advanced Research on the Changing Ocean Ecosystem" to the World Premier International Research Center Program (WPI), and contributed to its adoption in October 2023.

International Training for Young Personnel

(i) Goals for international human resource development of young researchers and degree of achievement

The goal was to improve communication skills and positive attitude to understand and soundly criticize each other's research across national and disciplinary boundaries, which was achieved to some extent.

(ii) Establishment of an international human resource development strategy for young researchers

Discussions in small groups of young researchers and students (mentored by senior researchers) across countries, institutions, and disciplines, and general discussions based on their reports were set up, and the results were compiled into reports or perspective papers led by young researchers and students, which were continued after the program period.

(iii) *Specific outcomes related to human resource development for young researchers*

The report or perspective paper in (ii) may become a peer-reviewed publication co-authored by the participating young researchers/students.

Strategies Following the Completion of the Program

(i) The following goals based on the completion of the program

We will specifically promote innovative interdisciplinary research on the marine environment and marine ecosystems.

(ii) Specific measures to achieve the following goals

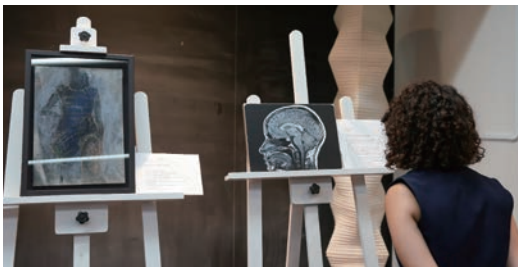
The ideas for interdisciplinary and fusion research obtained from the preparatory stage of this program to the implementation of the events will be turned into research projects under the leadership of the Advanced Institute for Marine Ecosystem Change (WPI-AIMEC), which was established in January 2024.

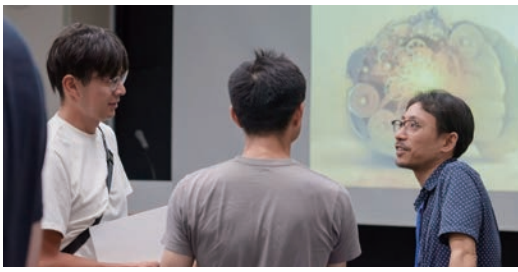
(iii) Future Prospects

The interdisciplinary and international research network established through this program will be further expanded and utilized to internationally extend the interdisciplinary projects on marine environment and marine ecosystems to be launched in (ii) above.

Junior Research Program | July 2023 – August 2023

Tohoku Initiative for NeuroTech Innovations





Junior Research Program | July 2023 – August 2023

Tohoku Initiative for NeuroTech Innovations

The brain represents one of the most complex systems in the whole world. The scientific desire to unravel its complexity drives the innovations in new neurotechnology, which in turn helps gain mechanistic insights into brain dynamics. In addition to fundamental neuroscience, the prevalence of neurological, psychiatric, and age-associated brain disorders in current society demands urgently the search for effective therapeutic solutions. Such pressing needs propel phenomenal advancement as well as clinical translations of novel neurotechnology therapies. Tohoku NeuroTech 2023, taking place in Sendai, aims to bring together leading academic researchers, industrial partners, and entrepreneurs working at the intersection of neuroscience, technology, and innovation.
In addition, Tohoku NeuroTech 2023 hosts NeuroTech Art exhibitions which features the innate entanglement between art, technology and science to explore the beauty, complexity, and mystery of the brain.

Important Goals and Degree of Achievement

The primary goals in advancing the program include "Promotion of NeuroTech technology development," "Strengthening industry-academia collaboration," "Dissemination of knowledge to a broader public," and "Exploration of ethical and social issues." Based on the common theme of "elucidating the complex workings of the brain," the program gathered researchers, engineers, and executives active in various fields such as neuroscience, neuroengineering, neural computation, and Brain-Machine Interfaces (BMI). Contributions from each expert led to multifaceted discussions, and we assess that most of the program's objectives were achieved. I, myself, gained new insights from the presentations and had meaningful exchanges of opinions. We received many positive feedback from participants, such as "gained a new perspective" and "glad I participated," demonstrating that the program served as a catalyst for cross-disciplinary and broadened thinking. For this program to be more than a fleeting experience, sustained effort and humility are required. I am confident that this program has cast an important stone to create a virtuous cycle of new goals and challenges to come.

Program Organizers

Yuanyuan Guo (Associate Professor, Frontier Research Institute of Interdisciplinary Sciences, Tohoku University)

Toshiharu Ichinose (Assistant Professor, Frontier Research Institute of Interdisciplinary Sciences, Tohoku University)

Hiroya Abe (Assistant Professor, Frontier Research Institute of Interdisciplinary Sciences, Tohoku University)

Highlights of Program

Lectures by leading experts clearly showcased the cutting-edge innovations and practical possibilities in NeuroTech technology. These offered invaluable knowledge and insights to a diverse audience, including scientists, engineers, and executives.

After the program's conclusion, the art exhibition that followed represented a unique approach to extending and deepening the scientific elements of NeuroTech through sensibility and art. The exhibition featured a variety of formats—flower arrangements, panel photographs, and paintings—all of which were infused with NeuroTech elements. This allowed participants to experience a new perspective where science and art converged. In particular, an installation work by the artist Tomonori Iwama, displayed in the second-floor exhibition room, created an unreal space with a NeuroTech theme, immediately captivating attendees. This once-in-a-lifetime installation deepened participants' understanding of the new sensory experiences and expanded perceptions made possible by NeuroTech.

In summary, the program successfully offered both academic sessions for systematically understanding the forefront of NeuroTech and an art exhibition for exploring it on a sensory level. This dual approach provided participants with multifaceted satisfaction and insights. It can be considered evidence that the program achieved its diverse objectives—scientific understanding, enrichment of sensibility, and contribution to society—at a high level.

Principal Invited Researchers

Haruhiko Bito (The University of Tokyo)

Naotaka Fujii (Hacosco Inc.)

Ken–ichiro Tsutsui (Tohoku University)

Ritchie Chen (University of California, San Francisco)

Yukinori Hirano (The Hong Kong University of Science and Technology)

Marylka Yoe Uusisaari (Okinawa Institute of Science and Technology)

Specific Strategies for International Research Exchange

Technological advancements in Neurotechnology (NeuroTech) hold significant promise for addressing a range of societal challenges related to mental and physical health, notably in the areas of disease prevention, diagnosis, and treatment. In this context, international collaboration and industry partnerships are deemed crucial components for progress. This symposium, mindful of these considerations, delved deeply into cutting-edge neuroscience and technology. This intellectual forum was the first face-to-face event to be held since the spread of the COVID-19 virus and successfully invited prominent young researchers from abroad. As a result, meaningful exchanges with numerous researchers, engineers, and executives were realized. This forum laid the groundwork for continuous information exchange. Collaborative budget applications are being advanced with multiple exchanged researchers and executives, and plans for startup collaborations in industrial partnership are also being made. Specifically, concrete steps are being taken to apply for international matching funds, such as the Human Frontier Science Program. Additionally, research exchanges between Tohoku University and France are expanding, with specific plans underway for personnel exchange and collaborative research. Overall, such strategic and tangible efforts are likely to strengthen international and industrial collaboration in the NeuroTech field, and promote its broader application to various societal issues.

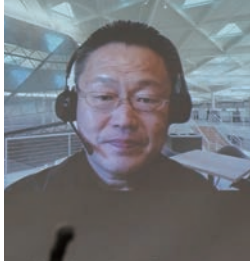
International Training for Young Personnel

This program was primarily orchestrated by emerging researchers, who presented their research findings and business visions alongside industry leaders. Such an environment proved highly conducive for the active exchange of information, providing a forum for sharing new perspectives and ideas. Art exhibitions, similarly led by younger talents, added another dimension to the experience. In this way, the program served as a platform where science and art intersected, offering opportunities for the next generation of leaders to broaden their skills and horizons.

This initiative is expected not only to contribute to the development of young talent capable of performing on the international stage but also to inject new energy into research and business across various sectors. Specifically, the program is likely to foster the formation of international networks and promote a multicultural perspective. Furthermore, the sustainability of such activities increases the probability that young researchers and business leaders will continue to grow and ultimately become influential figures in their respective fields. Therefore, this program is considered to contribute not merely as a one-off event but also towards the long-term objective of nurturing sustained growth in emerging talent.

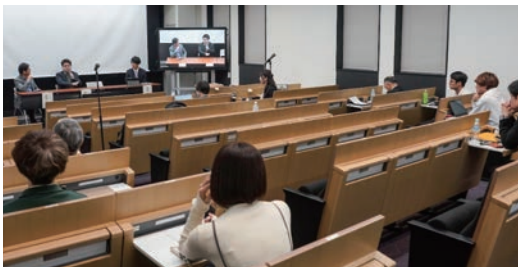
Strategies Following the Completion of the Program

The post-program strategy for the Tohoku NeuroTech initiative is crucial for maximizing the impact of the program and establishing a sustainable framework for research and industrial collaboration. Leveraging the already established research network, funding applications will be made both domestically (e.g., JST CREST) and internationally (e.g., Human Frontier Science Program; ANR-JST CREST). This will ensure the continuity and expansion of research activities. Building on the success factors of the existing Tohoku NeuroTech program, planning for a new program focusing on interdisciplinary integration is also in progress. Such an initiative will further strengthen the bond between research and industry, while promoting cutting-edge scientific and technological developments. Moreover, partnerships with industry will be sought to move university-developed technologies toward practical application stages. Consideration will also be given to the potential for new startups based on these technologies, thus applying research outcomes for the benefit of society. Overall, these strategic efforts are indispensable for fulfilling the objectives of the Tohoku NeuroTech program and establishing a long-lasting foundation for research and industrial alliances.



Future Society Design Program | December 2023

Contributions of XR Technology to Education and Society: The Metaverse and International Collaborative Creation



Future Design Research Program | December 2023

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The capacity of XR (Extended Reality) technology to transcend the limitations of communication has led to its adoption in a diverse range of contexts, including international industry-academia collaborations. Among these, XR technology is being increasingly utilized in the field of education. In particular, the metaverse, a recently emerging XR technology, is anticipated to facilitate education in which anyone can participate beyond the constraints of time and place. Against this backdrop, this program aimed to promote international and interdisciplinary exchanges and collaborations through XR technology to build a future educational foundation for the development of diverse human resources who can respond creatively to various social issues.

The program held two international symposia listed below, with a total of 23 experts participating from overseas universities, the related ministries, the legal profession, and industry. The experts presented the latest examples of utilizing XR technology in education and society. They also discussed strategies for creating a future environment more suitable for international collaboration and the advantages and challenges of utilizing the metaverse in future education. This was done with a view to SDG 4 "QUALITY EDUCATION: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."

- [International Symposium 1] *The Metaverse and XR Technology: Educational Applications and International Collaboration*. December 2-3, 2022.

- [International Symposium2] *XR Technology and International Collaboration: Educational and Social Contributions*. December 1-2, 2023.

Important Goals and Degree of Achievement

This program has made significant contributions to both education and industry-academia collaboration. It also provided a platform to foster intercultural exchange and collaboration. The intersection of diverse cultures and expertise has generated new ideas and solutions, marking a significant step towards the practical application of XR technology Therefore, it can be stated that the XR/Metaverse International Virtual Exchange, based at Tohoku University, is an ongoing international metaverse co-creation initiative. In terms of education, a collaborative HyFlex [hybrid flexible] education model using VR [virtual reality] conferencing tools was proposed. This has contributed to the development of international perspective among young researchers and students by providing broad opportunities for cross-border and interdisciplinary exchange. This approach is introduced as an innovative example in the “Guidelines for the Implementation of Distance Education at Universities and National Institute of Technology '' by the Ministry of Education, Culture, Sports, Science and Technology [MEXT] of Japan.

ith regard to industry-academia collaboration, VRChat and Tohoku University have signed into a partnership agreement, the first of its kind for a Japanese educational institution. One of the triggers was a VRChat lecture at the second International Symposium in this program: the arduous efforts of Prof. Masako Hayashi, the main organizer of this program, resulted in this

partnership agreement. This achievement is expected to further improve the use of the Metaverse in the XR/Metaverse International Virtual Exchange, an international collaborative learning program based at Tohoku University. Additionally, the second International Symposium of this program received support from the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

Thus, this program has achieved satisfactory results, and it is expected that this initiative will take root widely in society and achieve further development in the future.

Program Organizers

Masako Hayashi
(Associate Professor, Institute for Excellence in Higher Education, Tohoku University)

Norihiro Nakamura
(Professor, Institute for Excellence in Higher Education, Tohoku University)

Masayuki Ohzeki
(Professor, Graduate School of Information Sciences, Tohoku University)

Yusuke Morita
(Professor, Faculty of Human Sciences, Waseda University)

Hidefumi Yagi
(Specially Appointed Senior Assistant Professor, Center for the Advancement of Open Online Education, Tohoku University)

Takeshi Koike
(Appointed Associate Professor, Institute for Excellence in Higher Education, Tohoku University)

Ryo Kitamura
(Ricoh Japan Co., Ltd.)

Highlights of Program

■ Highlights of the International Symposium 1

In the keynote lectures at the International Symposium 1, Hirotsugu Takizawa, Executive Vice President of Tohoku University, presented examples of how XR Technology and the Metaverse are being utilized at Tohoku University for educational and research purposes. Masaru Kitsuregawa, Director of the National Institute of Informatics, also delivered another keynote lecture, providing examples of XR and Metaverse education in the global context to discuss the new DX curriculum for education in Japan. Including these lectures, 15 lectures were delivered, and two panels were conducted over the course of two days, providing new insights for the participants. This symposium was also innovative in its online distribution. In addition to the onsite venue, it was simultaneously distributed to four locations: Zoom, three Metaverse venues, and Metaverse Salon. This initiative has garnered significant attention from the media and was featured in various outlets. Notably, the symposium was covered in the December 3, 2022 edition of the Kahoku Shimpo. Furthermore, Tohoku University Press is set to publish a

book compiling the lectures from the first symposium by the end of 2024.

■ Highlights of the International Symposium 2

The International Symposium 2, supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), brought together a wide range of speakers from industry, academia, and government, which helped us to build new networks. We had the honor of hosting lectures by representatives from both the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Internal Affairs and Communications. Of special note was the lecture by Christopher Hornyak from VRChat, one of the world's leading metaverse platforms based on U.S.. His talk was given in an avatar from the Metaverse. Introducing the world of Metaverse in VRChat, he talked about how we can facilitate XR communication research through shared virtual spaces. This event was a catalyst for the partnership agreement between VRChat and Tohoku University. Additionally, we had the privilege of hosting lectures by representatives from leading XR-related technology companies such as Nvidia, Unity, TOPPAN, and Hacosco. We are currently advancing our collaborations with these companies.

Specific Strategies for International and Domestic Research Exchange with Research Institutes, Industries, Local Governments, etc.

The specific goal in this program was to develop an international collaborative learning program utilizing Metaverse, which has been successfully achieved. The research exchange at the two symposia yielded valuable insights into the use of the Metaverse in education. These insights have been incorporated into educational practice in Japan and abroad.

In 2022, we conducted a 360° live-streaming class using VR goggles with cooperating schools in each country. This was done in order to reproduce the actual classroom environment in VR. Additionally, we also attempted an experimental collaboration with students from different countries to create various metaverse worlds in VR in order to foster cross-cultural understanding among them. In 2023, visiting National University of Singapore and Fu Jen Catholic University in Taiwan, Prof. Hayashi conducted cross-cultural exchange and HyFlex class by using Metaverse, successfully engaging a total of 100 participants.

To date, over 50 international students from nine universities across seven countries have participated in this program. They have not only engaged in cross-border interactions within the Metaverse but also collaborated on the creation of Metaverse worlds. While there are many instances of bilateral collaborative learning, our project is leading the way in multinational XR Metaverse collaborative learning courses globally.

The international collaboration established through this program resulted in our selection for the Grant-in-Aid for Scientific Research Acceleration Fund B. We initiated joint research with researchers in the UK, Singapore, China, Indonesia, Belgium, Kenya, Vietnam, and Taiwan. The results of this research will be submitted to international journals. This activity is expected to lead to further joint research projects.

Principal Invited Researchers

Tomohiro Amemiya
(The University of Tokyo, Japan)

Naotaka Fujii
(Hacosco, Inc. / Digital Hollywood University)

Christopher Hornyak
(VRChat Inc., U.S.A.)

Masaru Kitsuregawa
(Director–General, National Institute of Informatics / The University of Tokyo, Japan)

Jun Takamoto
(Ministry of Internal Affairs and Communications, Japan)

Hideaki Tanaka
(NVIDIA Corporation, Japan)

Koji Umehara
(Ministry of Education, Culture, Sports, Science and Technology, Japan)

* Affiliations and positions are as they were at that time.

International Training for Young Personnel

This program involved 15 students in an international collaborative learning class utilizing the Metaverse. This provided students with the opportunity to develop skills for the creation of virtual worlds and online distribution. As part of the curriculum, students participated in a course on Unity, one of the most popular game engines. They were encouraged to apply their newly acquired skills in a final presentation. Furthermore, a team of undergraduate and graduate students from the School of Medicine, the School of Science and Engineering, and the School of Economics has collaborated to produce a paper evaluating the efficacy of the educational use of the Metaverse. Thus, this program has not only facilitated international collaboration but has also contributed to the advancement of young researchers and students in their technical abilities and interdisciplinary research competencies. Participants from overseas partner institutions who meet certain requirements will be awarded an open badge, a micro-credential, for the "VR and Metaverse Intercultural Exchange Program" by the Institute for Excellence in Higher Education and Student Support at Tohoku University.

Strategies Following the Completion of the Program

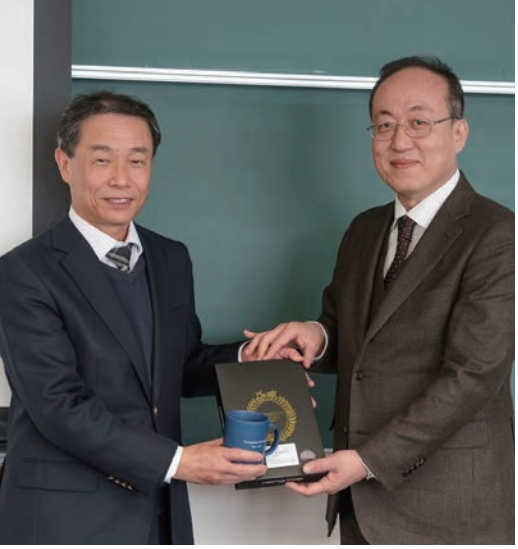
As a strategy following the completion of the program, the following will be promoted.

(i) Regarding collaboration with research institutions, companies, and local governments, we will expand and improve the quality of XR/Metaverse international immersive education and deepen cooperation with universities and industries at home and abroad. In addition, we will promote the joint development of new technologies and educational programs by taking advantage of the industry-academia collaboration with VRChat and other XR Metaverse-related companies.

(ii) To achieve the next goal, we will secure further research funding and sustain our research by publicizing the results of verification of educational effects based on objective evaluation indices and widely appealing the effectiveness of educational use of the Metaverse.

Moreover, we will endeavor to disseminate and expand the "Connected University Strategy" developed by Tohoku University to the global community. This strategy provides a multitude of learning environments and encourages the integrated use of cyber and real space.

(iii) The further goal in the future is to establish the “XR International Immersive Communication Education Center” as an organization to integrate knowledge from the legal, technological, and educational fields, apply it to actual educational settings and explore ways to improve the effectiveness of education.





Future Society Design Program | June 2023 – February 2024

How can the Digitalization of Japan's Democracy be Promoted? : The Environmental Improvement for Digital Democracy from the Perspective of Institutions, Awareness, and Technology








Future Design Research Program | June 2023 – February 2024

How can the Digitalization of Japan's Democracy be Promoted? : The Environmental Improvement for Digital Democracy from the Perspective of Institutions, Awareness, and Technology

The Great East Japan Earthquake and the new Coronavirus disaster have brought the need to utilize digital technology in the institutions that support Japan's democracy. However, while we understand the significance of using digital technology, the reality is that progress in its use has been slow. In our program, we asked the question, "Why has digitalization of the institutions that support democracy in Japan not progressed?" Through exchanges with researchers in the U.S. and South Korea, we examine the three factors that inhibit digitalization: institutions, awareness, and technology. In addition, our program also included a theme of how technology should be implemented in society.

The following four events were conducted in our program.

(1) At the DX seminar for local councilors held in June, Kawamura explained the current status of digitalization of local councils in Japan, Go explained the situation in Korea. Ishiwatari, an NESIC (NEC Networks & System Integration Corporation) employee, also gave a demonstration.

(2) In the i-voting experience held during the Tohoku University Open Campus, Kawamura explained the challenges of introducing i-voting to the participants, and Ichinosawa introduced the demonstration experiment in Tsukuba City.

(3) In November, an exchange seminar, which invited Professor Matt Golder and Sona Golder from Pennsylvania State University, was held between young researchers and overseas researchers. This seminar was supported by the V-Dem regional center for Eastern Asia.

(4) The "Japan-Korea Regional Informatization Research Forum in Tohoku University" held in February was a research exchange meeting, where executives from the KARIS visited Japan. They introduced Korean efforts to promote regional informatization and exchange opinions with Japanese companies and public organizations. The event was attended by some local government officials and general participants.

Important Goals and Degree of Achievement

One of the goals of our program was to stimulate public opinion for the promotion of digitalization of politics and administration through the dissemination of information to society. Another goal was to create a forum for collaboration involving IT companies, local governments, and other public organizations in anticipation of social implementation.
The content of our program had a high affinity with the demonstration experiment of Tsukuba City Super City Tokku and the contents of the report of the 33rd Chiho Seido Choosa-Kai (Local Government System Research Council). With the launch of the Digital Agency and the fact that DX for local governments had become an administrative issue, our program attracted a lot of attention from local government officials and companies interested in DX for local governments.

It is difficult to say whether we have fully achieved our initial goals. As we will discuss later, we recognized that while research can be conducted online and results can be shown, it is not easy to hold an event related to politics and political science in Sendai and move the world. It was not possible to arouse public opinion on a broad scale.
However, we believe that we were successful in that we were able to promote future joint

research through exchanges with the KARIS, as well as accumulate know-how on networking with some companies and public organizations.

Program Organizers

Harumichi Yuasa (Professor, Meiji University)
He is a graduate of Keio University and was awarded a Master of Laws degree from Aoyama Gakuin University. After serving as Vice President of Kyushu International University and Vice President of the Institute of Information Security, he has been in his current position since 2021. His research field is jurisprudence and he is familiar with information law and public office election law. His role in this project is to point out the challenges of digitalization of democracy from legal theory.

Seon-gyu Go (Invited Professor, Daegu University, South Korea)
After receiving a PhD in Information Science from Tohoku University, he served as a professor at the Election Training Institute of the Korean Central Election Commission assuming his current position. His major is in political engineering and his research focuses on the impact of AI and robots on the political environment. His role is to build a network of project participants in Japan and Korea.

Yasutomo Kimura (Professor, Otaru University of Commerce)
After completing his doctoral studies at Hokkaido University, he was assigned to Otaru University of Commerce. He studies natural language processing techniques and has constructed a corpus of Japanese local assembly minutes. He examines the institutions that facilitate the construction of a corpus of minutes in this project.

Mitsuru Ichinosawa (President, VOTE FOR Company, Spiral Inc.)
He has been conducting research on i-voting and online electoral campaigns while running companies such as “SEIJIYAMA,” a politics and election platform. He is also participating in a demonstration project of Internet voting in Tsukuba Super City Tokku (Special Zone). His role in this project is to point out the significance of the research from a practitioner’s perspective.

Jae-young PARK (CEO, KEVOTING, Inc., South Korea)
In 2017, he started KEVOTING, a company that develops mobile voting terminals and systems in South Korea; by 2023, the company will export mobile voting systems to Kyrgyzstan and other countries for global expansion. He was responsible for providing information on the progress of digital democracy in Korea.

Highlights of Program

One of the successes of the program has been its ability to involve non-researchers in the project. Although small, the creation of a collaborative research network between researchers, companies, and public organizations created a situation that is expected to grow in the future.

Some of the Korean researchers who attended the event were interested in Japan's efforts to revitalize local communities using digital technology in an era of declining population. He commented, "It was instructive to learn how digitalization differs from the Korean approach, which tends to lean toward efficiency. Different countries, cultures, and histories have different perceptions of digitalization, and there are different points to be aware of when

implementing technology in society. We were able to reaffirm the significance of conducting international comparative research.

The seminar with Prof. Golder and others was very useful for promoting joint research and effective as an opportunity for research exchange with young researchers. However, it was also an opportunity to recognize the limitations of conducting an international political science seminar in Sendai, and we were able to conduct the Golder seminar as a joint program with Waseda University with the cooperation of Professor Yoshikuni Ono, who had been a professor at Tohoku University.

Even with the spread of social networking services, the power of mass media for social recognition is still quite large. Especially in centralized countries such as Japan and South Korea, it is more effective to disseminate information in the capital city in order to make the results of social science research widely known to the public. How to think about this is an issue for the future.

Specific Strategies for International and Domestic Research Exchange with Research Institutes, Industries, Local Governments, etc.

In implementing this program, we were aware of the possibility of applying for future research grants such as JST's RISTEX. We were also very careful about what kind of incentives we could offer to companies and public organizations for joint research. As for the exchange with the KARIS, Kawamura and Yuasa presented a paper at the conference of the KARIS in October, and we were able to invite them to the conference as a reciprocal offer. The February event was held as a result of a successful "give-and-take" relationship.

One of the goals of this project is to contribute to the promotion of digitalization in the fields of politics and public administration in Japan through research exchange. Our exchange with researchers belonging to the KARIS gained a lot of knowledge. For example, we learned that "a special digital zone was created in Jeju Special Self-Governing Province, where large and small companies such as Kakao Talk and NAVER have gathered to conduct big data research," and that "due to the historical situation where digitalization and democratization progressed simultaneously, people think more favorably about digital technology than in Japan.

This information was then shared with NESIC, Spiral Inc., and the National Association of Chairpersons of Prefectural Assemblies to help advance the digitization of Japan's political administration.

Principal Invited Researchers

Matt Golder (Professor, Pennsylvania State University, USA)

He earned a PhD in Political Science from New York University. He is a professor in the Department of Political Science at Penn State University, where he is also the director of the Honors Program. His research interests include political representation. His major publications include Interaction Models: Specification and Interpretation, Principles of Comparative Politics, and Foundations in Comparative Politics.

Sona Golder (Professor, Pennsylvania State University, USA)

She earned a PhD in Political Science from New York University. She interests in the theory of political institutions, especially coalition formation. She was formerly a co-editor for the British Journal of Political Science and is currently an associate editor for Research & Politics and on the editorial boards for the American Journal of Political Science and Political Science

Research and Methods.

Min Seok Bang (Professor, Dankook University, South Korea)
He earned a PhD in Public Administration from Sungkyunkwan University in South Korea. After working as a senior researcher at the Regulatory Research Center of the Korea Institute of Public Administration, he is a professor at Dankook University's School of Public Administration and Law. He specializes in e-government, information policy and science and technology policy. He is currently serving as President of the KARIS (Korean Association for Regional Information Society).

Jin-won Lee (Professor, University of Seoul, South Korea)
He earned his Juris Doctor from Tohoku University. He is interested in Japanese Politics and Korea-Japan relations. He is a veteran scholar of Japanese studies in Korea, having served as president of the KAJA (Korean Association of Japanology). In this project he is responsible for creating an environment to promote research exchange between Japan and Korea.

Yoshikuni Ono (Professor, Waseda University)
He received a PhD in Political Science from the University of Michigan in 2010. He is a Research Fellow at the Regional Center for Eastern Asia of the Varieties of Democracy (V-Dem) Project, an international democracy research project. Prior to his current position, he was a professor at Tohoku University School of Law. His research interests include Japanese politics and political behavior. He has an extensive network of political scientists in Europe and the United States. His role in this project is to provide a network for young political scientists in Japan.

International Training for Young Personnel

In order to foster internationally oriented young researchers, our program implemented the following three activities.

(1) Daily research exchange with Prof. Lee and Prof. Go during their short stay at Tohoku University

(2) Seminars with Prof. Golder and others

(3) Events inviting executives of the KARIS, companies, and public organizations

We thought it would be meaningful to provide multiple stimuli to young researchers.

Unfortunately, few young researchers at Tohoku University responded to these attempts. In November 2022, we held a nearly similar event at Waseda University, which was attended by more than 50 young researchers and students.

Quantitative analysis in the field of political science is becoming mainstream, especially in the United States. In addition, the share of research that combines the humanities and sciences, such as this project, is increasing. Efforts should be made to bridge the gap with global trends.

Strategies Following the Completion of the Program

Our program is a part of the JSPS Bilateral Exchange Program "Municipal Administration and Policy Making Using AI/Robotics in the Era of the 4th Industrial Revolution (JPJSBP120228801)". Many of the members overlap. One of the outcomes is that we were able to invite key members of the KARIS in our event conducted in February 2024.

As of April 2024, academic international exchanges with the KARIS and other organizations will continue. Specifically, it has been decided to apply for international joint research opportunities offered by the National Research Foundation in Korea. (Professor Seok-hyun Song of Andong University will be the principal investigator, and Kawamura and Go will be co-investigators; NESIC is also considering participation.) A research exchange event with Inha University (May 2024) and a presentation by Kawamura at the KAJA (August 2024) are also planned. We are also planning to apply for a RISTEX research grant as a member of this program.

Research on fusion of the humanities and sciences led by researchers in the social sciences is limited at Tohoku University. In this respect, this program can be evaluated as a success.

With the National Association of Chairpersons of Prefectural Assemblies, an agreement has been reached to incorporate the results of the research into requests for institutional reform to the national government.

In many cases, collaborative research involving mainly engineers does not provide a realistic roadmap for social implementation. However, this joint research is broad in scope, involving public organizations, and the results are expected to be returned to society.





Future Society Design Program | September 2023 – March 2024

Sustainable Structural Integrity for Energy Infrastructure








Future Design Research Program | September 2023 – March 2024

Sustainable Structural Integrity for Energy Infrastructure

Life cycle management (design, manufacturing, and maintenance) of steel structures in plants and various infrastructures must be optimized to ensure safe and affordable facilities. For this purpose, it is essential to develop advanced models of many processes, e.g. corrosion, while ensuring reliability through regular inspections. During the program, academic foundations that enable life cycle management methods for infrastructure based on scientific rationality by integrating research on deterioration and damage mechanisms with nondestructive inspection were to be discussed and research monitoring, from the viewpoints of data science and risk assessment, was done.

To this end, the program held an international symposium, a workshop for young researchers, and a Japan-France workshop, providing a forum for sharing trends and discussing collaboration for the future.

Important Goals and Degree of Achievement

Life cycle management (design, manufacturing, and maintenance) of steel structures such as various energy plants and pipelines must be optimized to ensure safety and economic efficiency of facilities. For this purpose, it is essential to develop advanced models of deterioration and damage of structural materials and to ensure their reliability through inspection and monitoring. In addition, it is necessary to analyze a vast amount of acquired data related to deterioration and damage models, and to present the information in the form of structure risk assessment. This will enable life cycle management of structures based on risk information and scientific evaluation. This research program aimed to create an academic field that would enable this methodology.

In the context of the decarbonization policy that advocates carbon neutrality, it is necessary to plan the management of facilities with respect to various energy sources from a long-term perspective. In the use of fuel ammonia, which is currently being implemented both inside and outside of Japan, it is possible to discuss the safety and reliability of facilities. We are proud to have pioneered an old and new area in this field of materials, with French-Japanese collaboration at its core.

Program Organizers

Tetsuya Uchimoto (Professor, Institute of Fluid Science, Tohoku University)
Dr. Eng., Mechanical Engineering (Materials Evaluation), Applied Electromagnetics Mechanics Award 2023, the MEXT Young Scientists' Prize 2010

Nicolas Mary (Associate Professor, MATEIS, INSA-Lyon)
Dr. HDR., Material Chemistry, ORCID: 0000-0002-2917-5598, involved with cold spray methods for corrosion and tribocorrosion applications as a member of ELyTMaX

Yutaka Watanabe (Professor, Graduate School of Engineering, Tohoku University)
Dr. Eng., Nuclear Engineering (Corrosion Engineering), JSM Handbook, Maintenology for Nuclear Engineering (2020) ISBN-10: 4900622656, JCSE Technology Award (Japan Society of Corrosion Engineering, 2016)

Philippe Guy (INSA-Lyon, France, Associate Professor)

Ph.D, Nondestructive Testing, Ultrasonics, Coordinator of MEXT-ANR Bilateral Program for Nuclear R&D Cooperation, Piping sYstem, Risk management based on wAll thinning MonItoring and preDiction (PYRAMID)

Highlights of Program

Fuel ammonia is now expected to be a next-generation energy source for decarbonization, and its practical application requires urgent infrastructure development and facility maintenance for the production, transportation, storage, and energy production stages. This is an important topic from both technical and policy perspectives when discussing new life cycle management of large-scale facilities, which was the purpose of this program. In this program, researchers from related domestic and international research institutes and companies gathered to discuss the importance of risk management. It was also significant that they shared their recognition of the importance of working toward a new research agenda, which is to apply the existing risk-based maintenance to facilities to be installed in the future.

The participants also had the opportunity to exchange information on the latest findings of DX, risk assessment, and reliability assessment nondestructive inspection and monitoring for optimizing maintenance for energy plants in general. The ultimate goal of this program is to establish a life cycle management method for infrastructure based on scientific rationality by synthesizing these studies and integrating deterioration/damage mechanism research and nondestructive inspection/monitoring research from the perspective of data science and risk assessment. It is regrettable that we have not yet reached a conclusion on how to establish this academic field, and this is an issue to be addressed in the future.

Specific Strategies for International and Domestic Research Exchange with Research Institutes, Industries, Local Governments, etc.

The symposium was organized to address the latest research issues that are attracting attention in Japan and abroad regarding the life cycle management of steel structures for plants and various infrastructures, which was the purpose of this program. The symposium attracted a large number of participants from domestic and foreign research institutes and companies, and we believe that we were able to gain a good understanding of the topics covered by this program and achieve our initial goals regarding research exchange. It is also significant that this program has created a forum for exchange among researchers from different fields and between academia and industry. Although it will take some time in the future, we believe that there is sufficient potential for joint research and joint papers.

Principal Invited Researchers

Pierre Calmon (French Alternative Energies and Atomic Energy Commission, France)
Research director responsible for the development of CIVA, the world's leading non-destructive testing simulator, and for research on reliability assessment of non-destructive testing

Olivier Devos (Université de Bordeaux, France)
Professor specialized in electrochemistry, stress corrosion cracking, corrosion monitoring

Guy Feuillard (INSA Centre Val de Loire, France)

Director of International Relations, Professor specialized in development of piezoelectric materials and their application to ultrasonic transducers, material evaluation, and process monitoring

Toshiro Fujimori (IHI Cooperation, Japan)
Technical Director, expert of combustion engineering, especially ammonia combustion and the ammonia value chain

Ricardo Gonzalez (TOTAL Energies, France)
Years of experience in risk-based maintenance, inspections at petroleum refineries and petrochemical facilities, development of equipment management tools, and implementation of risk-based maintenance.

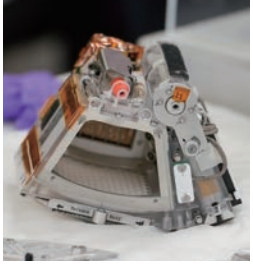
Vincent Mazauric (Schneider Digital, France)
IP Director, Principal Scientists specialized in electrical equipment engineering, recently engaged in energy policy and global warming countermeasures

International Training for Young Personnel

In this program, a workshop for young researchers on facilities management and risk assessment was held, and a part of the workshop was open to the French-Japanese summer school for graduate students, ELyTSchool2023. The program also collaborated with intensive graduate school lectures. Through these efforts, we conveyed the attractiveness of this research topics and identified perspective young researchers in this field. Although the effectiveness of this first effort is yet to be determined, we plan to hold regular seminars in the ELyTGlobal, a joint research program between Japan and France.

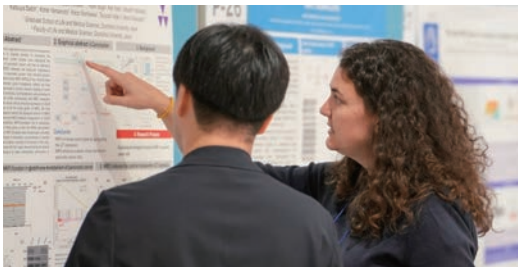
Strategies Following the Completion of the Program

This program was planned and managed based on the collaboration between the French-Japanese joint laboratory ELyTMaX and the French-Japanese research network ELyTGlobal program. We will continue to plan and operate the ELyTGlobal program on a regular basis. In the future, regular workshops between industry, academia, and government will be held and joint research topics will be explored. These activities will be conducted within the framework of the ELyT Program and will also be followed up by the Steering Committee of ELyTGlobal program consisting of representatives from both universities.



Future Society Design Program | November 2023

Environmental Stress Response and Survival Strategy of Human Being



Future Design Research Program | November 2023

Environmental Stress Response and Survival Strategy of Human Being

Elucidation of response mechanisms to environmental stress will lead to the establishment of improved human survival strategies for the benefit of future societies. The applicants are energetically working on the analysis of the KEAP1-NRF2 system, which is important for environmental stress responses, in order to elucidate the molecular basis of gene expression control, which forms the basis of the response mechanism to environmental stress. In addition, in order to clarify the contribution of the KEAP1-NRF2 system to the suppression of space stress, which is one of the most severe environmental stresses, we conducted an experiment in which NRF2-deficient mice stayed on the International Space Station (ISS). Preparations are underway for a second experiment in which a new set of mice stay at the ISS. Furthermore, Prof. Yamamoto has led the establishment of the Tohoku Medical Megabank Organization (ToMMo) and is accelerating the graduate school's efforts toward personalized preventive and genomic medicine. We invited researchers from around the world who are working on these issues, and held an international symposium to exchange the latest knowledge and explore future prospects. In addition, with the cooperation of the Japan Aerospace Exploration Agency (JAXA), we held a lecture on space experiments for the public titled ``Space and Health.''

Important Goals and Degree of Achievement

We held an international symposium (English, 2.5 days), a public lecture (Japanese, 0.5 days), and an excursion (1 night, 2 days).

At the 6th International Symposium on Environmental Response, we focused on 1) molecular mechanisms, 2) diseases, 3) drug discovery, and 4) space and aging related to the KEAP1-NRF2 system and achieved outstanding results. We invited researchers from Japan and abroad. We also invited general participation from a broad range of researchers, whose contributions to the conference consisted of oral and poster presentations. The notable research results of the KEAP1-NRF2 regulatory system since the 5th conference include the contribution of joint research with JAXA to biological responses caused by space environmental stress, and the contribution of NRF2 inducers to biological responses through antioxidant and anti-inflammatory effects. NRF2 has also been reported to exhibit anti-COVID-19 virus activity, and there are high expectations for clinical drug development based on the KEAP1-NRF2 system.

In the open lecture for the general public, lectures were given in easy-to-understand Japanese, with a particular focus on space and aging, and simultaneous Japanese-English translation was provided so that symposium participants could also participate. A venue was also set up at the Sendai City Astronomical Observatory to broadcast the event live. JAXA provided us with the space breeding cages used in the space mouse mission and space mission-related posters, and we set up a space booth at the venue to display them and receive individual explanations from JAXA staff.

During the excursion, the participants visited Matsushima, Ishinomaki City Earthquake Ruins at Okawa Elementary School, and ToMMo Tagajo Regional Support Center, where they learned about the significance of ToMMo, which was established in the wake of the Great East Japan Earthquake, and were blessed with the fall foliage season to fully enjoy Japan's autumn.

All programs were carried out as planned, and all were well received by participants, with a 100% success rate.

Program Organizers

Masayuki Yamamoto
Tohoku University Tohoku Medical Megabank Organization, Director/Professor
Tohoku University Graduate School of Medicine (Doctor of Medicine), Medical Chemistry
Prof. Yamamoto has earned high praise across a wide range of research from biochemistry to molecular genetics and has been selected as a “Highly Cited Researcher” by Clarivate Analytics every year since 2019. As part of the 2011 earthquake recovery project, Tohoku University established the Tohoku Medical Megabank Organization (ToMMo), which is contributing to the construction of futuristic medical care with the aim of popularizing and realizing genomic medicine in Japan.

Highlights of Program

(i) Points of success and points of reflection
Success points: All programs were successfully completed with positive feedback from many participants.
Points to consider: The schedule overlapped with a major event in the city, and the price of accommodation in the city tripled, making it difficult to make reservations. This was unavoidable as the event had not yet been decided at the time of deciding on this date.
In the citizen lecture, some members of the public expected the lecture to be delivered online rather than on-site. This was not possible due to hurdles such as building an online system, but if live streaming had been possible, more people might have been able to attend.
(ii) Coverage in domestic and international media, etc.
Two projects, a citizen's course and an excursion, were simultaneously selected for the Japan Tourism Agency's project to improve competitiveness in attracting international conferences for the post-corona era.
Professor Kensler and Professor Dinkova-Kostova were interviewed on behalf of the invitees, and the Japan National Tourism Organization (JNTO)'s invitation and host report has been published.
Japanese: https://mice.jnto.go.jp/organizer-support/case-study/detail/nrf2-vi.html
English: https://www.japanmeetings.org/plan-your-event/case-studies/nrf2-vi.html
On campus, we published the event report on ToMMo and INGEM, which were sponsored by us.
ToMMo: https://www.megabank.tohoku.ac.jp/news/56376
INGEM: https://www.ingem.oas.tohoku.ac.jp/archives/1431

Specific Strategies for International and Domestic Research Exchange with Research Institutes, Industries, Local Governments, etc.

Of the 142 participants, 57 people from 14 overseas countries and 85 people from 11 prefectures in Japan participated in this event. We received great support from two pharmaceutical companies (Chugai Pharmaceutical Co., Ltd. and Kyowa Kirin Co., Ltd.), and there were also research presentations. Additionally, we were able to hold a public lecture with the cooperation of JAXA and the Sendai City Astronomical Observatory. Kagome Co., Ltd., which sponsored us, provided drinks.

(i) Goals of research exchange and their achievement level
Four years have passed since the 5th conference held in 2019 due to the coronavirus pandemic, and we were able to conduct on-site research exchanges. As an unprecedented project, we held a citizen lecture on "Space and Health" to widely inform not only researchers but also the general public about the space mouse experiment that Tohoku University is conducting jointly with JAXA and its results.

(ii) New knowledge
We were able to listen to a lot of unpublished data and learn about the progress of cutting-edge research.

(iii) Possibility of joint research and joint papers, etc.
Symposium participants have requested the donation of genetically modified mice created by the organizers, and new joint research is underway.
The participants of the symposium discussed the chemical synthesis techniques that they specialize in, and began joint research in the organizer's laboratory to conduct experiments to verify the functions of the chemical substances in living organisms.

(iv) Specific results to be noted regarding research exchange, etc.
By holding an overnight excursion, we were able to provide time for frank conversation among the researchers, providing an opportunity for active research exchange.

Principal Invited Researchers

Thomas W. Kensler
PI, Fred Hutchinson Cancer Research Center, Professor Emeritus
Johns Hopkins University
Tohoku University Specially Appointed Professor (Visiting)
Honorary Member of the Japanese Biochemical Society, Ph.D. Public Health
Prof. Kensler conducted field surveys and intervention studies on environmental pollution in China and found that Nrf2 inducers are effective in preventing the onset of diseases caused by food and air pollutants. In recognition of this long-term research, he was awarded the 2011 Chinese Government Friendship Award. Starting with joint research using Nrf2-deficient mice, Prof. Kensler and Prof. Yamamoto have been conducting joint research for many years. In 2012, he jointly won the Oxygen Club of California Jarrow Health Science Award with the Prof. Yamamoto. In 2021, he mentored young researchers at Tohoku University as an overseas advisor faculty member at the Center for Innovation in Future Medicine (INGEM).

Antonio Cuadrado
Professor, Autonomous University of Madrid, Spain Biochemistry
Prof. Cuadrado is the representative of a large network (BenBedPhar) that brings together NRF2 researchers around the world, which was adopted by the EU-funded program COST Action 2021-2025 by the European Cooperation in Science and Technology (COST Association). It includes researchers not only from developed countries but also from research developing countries, mainly in Europe.

Albena T. Dinkova-Kostova
Professor of Biochemistry, University of Dundee, UK
Prof. Dinkova-Kostova began research on the Keap1-Nrf2 system under Professor Paul Talalay, who discovered the Nrf2 inducer sulforaphane, a component of broccoli sprouts.

Donna D. Zhang
Professor, Toxicology, University of Arizona, USA
Prof. Zhang is working on elucidating the molecular mechanisms involved in Nrf2 activation, and discovered the Nrf2 inhibitor brusatol. Prof. Zhang is scheduled to transfer to the Scripps Research Institute this spring.

Terry W. Moore
Associate Professor, Pharmacology, University of Illinois at Chicago, USA
Dr. Moore is actively undertaking a chemical approach to develop inhibitor drugs for the Keap1-Nrf2 interaction.

Gina M. DeNicola
Professor, Tumor Biology, Moffitt Cancer Center, USA
Prof. DeNicola is analyzing the molecular effects of cancers in which Nrf2 is activated.

International Training for Young Personnel

(i) Goals for human resource development of young researchers and their achievement level
Abstracts were selected from among the poster presentations, and young researchers were also given the opportunity to make oral presentations. Free discussion was allowed during the poster presentation period, and all posters were kept on display during the poster presentation period, resulting in lively individual discussions. It seemed that there were few questions from young researchers during the oral presentations, so this will be an issue for the future.

(ii) Developing strategies for developing young human resources
Poster presentation awards were established mainly for young researchers to encourage their research results. Students belonging to the laboratory also participated in the management of the symposium, giving them a first-hand experience of international exchange. This was a valuable experience as there have been few opportunities for face-to-face presentations in Japan over the past few years due to the coronavirus pandemic.

(iii) Specific achievements to be noted regarding the development of young human resources, etc.
For students who had vague hopes of studying abroad, participating in the international symposium was very stimulating and allowed them to meet researchers who matched their research, which gave them the opportunity to develop a strong desire to study abroad after graduation.

Strategies Following the Completion of the Program

(i) Future collaboration with research institutions, companies, local governments, etc.
We have built strong collaborations with research institutions and companies with which we

have conducted joint research. We would like to thank the Sendai City Tourism and International Association for their support in applying for the Japan Tourism Agency's citizen course and excursion grants. In particular, when collaborating with local governments, it is desirable to obtain their cooperation at the planning stage.

(ii) Specific measures to achieve the following goals:
In order to hold a symposium of the same scale as this one, it would be necessary to form an organizing committee and plan the event about two years in advance. Obtaining the budget is the main concern, and planning needs to be done as early as possible.

Future Society Design Program | August 2023 – February 2024

Positioning of Nuclear Energy in Sustainable Energy Strategies – Redefining from a Risk Management Perspective

Future Design Research Program | August 2023 – February 2024

Positioning of Nuclear Energy in Sustainable Energy Strategies
– Redefining from a Risk Management Perspective

The final goal that this program is oriented toward is the redefinition of the availability and positioning of nuclear energy as an option to achieve a sustainable energy strategy for Japan, aiming to realize both carbon neutrality and economic security in 2050. The essential characteristic of nuclear energy is the existence of significant potential hazard in terms of handling nuclear reactions and radioactive materials. This feature exists consistently throughout the operation of nuclear power facilities, their decommissioning, and the disposal of radioactive waste. On the other hand, the high energy density resulting from nuclear reactions is advantageous for generating electricity.

Furthermore, technologies are being developed to prevent the manifestation of risks. In collaboration with the "Fastest Path to Zero Initiative" at the University of Michigan, ranked first in the U.S. for nuclear energy education and research, this program will rethink nuclear energy technology from the risk perspective and redefine its position in Japan's sustainable energy strategy. We will conduct the following two activities to rethink nuclear energy technology from a risk perspective and contribute to redefining its position in Japan's sustainable energy strategy.

Sub–Theme 1: Risk Management and Safety Regulation in General Reactor Decommissioning

Discussing the similarities and differences between Japan and the U.S. in terms of risk management, such as identification of hazardous sources, risk management, and compatibility with economic efficiency, as well as the thinking behind the risk, to find hints for safe progress in decommissioning of nuclear power reactors in Japan.

Sub–Theme 2: Will risk reduction technologies make nuclear energy acceptable?

To establish a forum for dialogue to discuss the direction of technological development that can convince the public of its safety.

Program Organizers

Yutaka Watanabe
(Professor, Center for Fundamental Research on Nuclear Decommissioning / Graduate School of Engineering, Tohoku University)

Makoto Takahashi
(Professor, Center for Fundamental Research on Nuclear Decommissioning / Graduate School of Engineering, Tohoku University)

Todd Allen
(Professor, Department of Nuclear Engineering and Radiological Sciences, University of Michigan)

Yugo Ashida
(CEO, JOINLU International Inc.)





Design Lab for our Future Co-existence | July 2023 – March 2024

TFC × TEL Collaboration Program: Designing a Digital and Sustainable Society






Design Lab for our Future Co-existence | July 2023 – March 2024

TFC×TEL Collaboration Program: Designing a Digital and Sustainable Society

Since late 20th century, unstoppable economic and industrial globalization has continued to spark serious concerns over sustainability. While digital technologies might have accelerated this process and brought further challenges such as digital inequality and poverty, they also have the potential to mitigate environmental and societal impacts and contribute to the sustainable and resilient society. The pressing need is to explore how we can effectively design a future Digital and Sustainable Society to steer our course for the better. In this light, this program organized the events listed below to design a future sustainable society in collaboration with the Tohoku Forum for Creativity and Tokyo Electron Limited.

Events

Pre–Lecture for the 2023 Workshop on "Designing a Digital × Sustainable Society: Weaving New Networks of Interdependency with Forests and Oceans"
(July 27, 2023)

Social Implementation Workshop 2023 "Local Business DX for Sustainability"
(August 9, 2023 – December 23, 2023)

The 2023 Workshop on "Designing a Digital × Sustainable Society" : Weaving New Networks of Interdependency with Forests and Oceans
(September 14, 2023)

Minamisanriku SDGs Fieldwork
(September 15, 2023)

Future Society Design Workshop "Considering Corporate Sustainability"
(September 15, 2023)

Industry–Academia Collaborative Exploration Meeting
(September 15, 2023)

International Symposium on Design for the Sustainable Society via Digital Technology – Developing Digital Human Resources for the Sustainable Society
(February 1, 2024 – February 2, 2024)

TEL Corporation Program Seminar
(March 6, 2024)

Tohoku Forum for Creativity and Tokyo Electron Limited Joint Project: Special Lectures On Discovery of Element 113, Nihonium: Towards the Discovery of Further Superheavy Elements
(March 9, 2024)

Design Lab for our Future Co–existence | April 2023 – December 2023

TFC × AXA Collaboration Program on Social Innovations in Insurance in the Digital Society

Design Lab for our Future Co-existence | April 2023 – December 2023

TFC×AXA Collaboration Program on Social Innovations in Insurance in the Digital Society

Operated in collaboration with AXA, this program aimed to identify the social issues to be solved by insurance and formulate the role of insurance in the future digital society. As part of this program, we organized the events shown below to provide opportunities for students, researchers, and industrial personnel to approach these social issues collaboratively. In addition, we delivered lectures to encourage students to improve their skills in data science and machine learning as well as their understanding of the social mechanisms of insurance.

Events

Lecture Course on Introduction to Life Insurance Business Management 2023
(April 13, 2023 – July 20, 2023)

Intensive Course on Risk Data Science and Insurance 2023
(June 5, 2023 – June 8, 2023)

Actuarial Mathematics Seminar 2023
(June 8, 2023 – November 10, 2023)

Insurance Career Seminar 2023
(October 23, 2023 / October 26, 2023)

Student Workshop on Changes in Marine Ecosystems in the Tohoku Coastal Region and the Future of Fisheries –How the lessons learned from the great East Japan earthquake will affect the future of the Tohoku Coastal Region–
(December 1, 2023 – December 2, 2023)

Public Lecture on Changes in Marine Ecosystems in the Tohoku Coastal Region and the Future of Fisheries –How the lessons learned from the great east Japan Earthquake affects the future of the Tohoku Coastal Region–
(December 2, 2023)

Design Lab for our Future Co-existence | February 2024

Discovery Intelligence Challenge 2024

Design Lab for our Future Co-existence | February 2024

Discovery Intelligence Challenge 2024

The recent remarkable developments in information technologies have led to the utilization of AI in various fields. These include medicine and justice, where confusing causal relationships with certain correlations can have fatal consequences. Accordingly, there is an urgent need to develop AI that can provide the reasoning behind its outputs. Under these circumstances, a fundamental question has emerged as a practical challenge for the future AI: what is causality? Against these backdrops, this program held the two symposia listed below to deepen and broaden our knowledge of causality and causation. The first one aimed to deepen our fundamental understanding of causality from different perspectives of philosophy, mathematics, and physics. The second one aimed to broaden our practical utilization of it by sharing our efforts in which various causal inference techniques have been applied to complex real-world problems.

Events

What is Causality: From the Perspective of Philosophy, Mathematics, and Physics
(February 19, 2024)

Causalities in Our Complex World
(February 21, 2024)

April 2023 – November 2023

Research DX Support Center

Research DX Support Center

The utilization and integration of data in scientific research is becoming more and more significant. In recognition of this trend, TFC established the Research DX Support Center in November 2020 to promote digital transformation (DX) in scientific research. The center has since organized the “Research DX Strategy Seminar” and “Practical Data-Driven Science Online Seminar” to share information on future research DX. In FY2023, a total of six seminars were held, two of which were co-sponsored by the Core Research Cluster for Materials Science, introducing the frontiers of materials informatics research and policy. In addition, the Research DX Strategy Seminar, titled “Research Data Management Symposium”, was held jointly with the Organization for Innovations in Data Synergy and the Unprecedented-scale Data Analytics Center. Lectures from NII were invited to enlighten the importance of research data management and utilization in the era of open science.

Events

17th Seminar: The Frontiers of Data–driven Astronomy and Astrophysics
(April 14, 2023)

Core Research Cluster for Materials Science FY2023 1st Seminar × 5th Research DX Strategy Seminar
(July 21, 2023)

18th Seminar: Seminar: The Future of Interacting with AI: The Emergence and Implications of ChatGPT
(September 1, 2023)

Core Research Cluster for Materials Science FY2023 2nd Seminar × 6th Research DX Strategy Seminar
(October 20, 2023)

Research Data Management Symposium: 5th UDAC × 7th Research DX Strategy Seminar
(October 30, 2023)

19th Seminar: COVID–19: From Genome Analysis to Public Health Measures – How far has Japan come with data–driven measures?
(November 30, 2023)

June 2023 – January 2024

Other Activities

Other Activities | September 22, 2023

Falling Walls Lab Sendai 2023

Since 2014, Tohoku University has hosted the Falling Walls Lab Sendai annually with the Falling Walls Foundation of Germany. The University has the honor of being Asia's pioneer venue for this esteemed competition for young researchers aged 18 and above. In 2023, the tenth competition was held. Out of 11 entries, 8 were selected for the presentation round. The passionate scholars responsible for the selected projects gave three-minute presentations on their research to break through global "walls."

The first-prize went to Mohamed Abd Elkodous, a Ph.D. student from Toyohashi University of Technology. The second place went to Emmanuel Awosu, a Ph.D. student from Tohoku University. These two winners presented their research at the Falling Walls Finale held in Berlin on November 7.

Other Activities | June 19, 2023 – August 8, 2023

g-RIPS-Sendai 2023

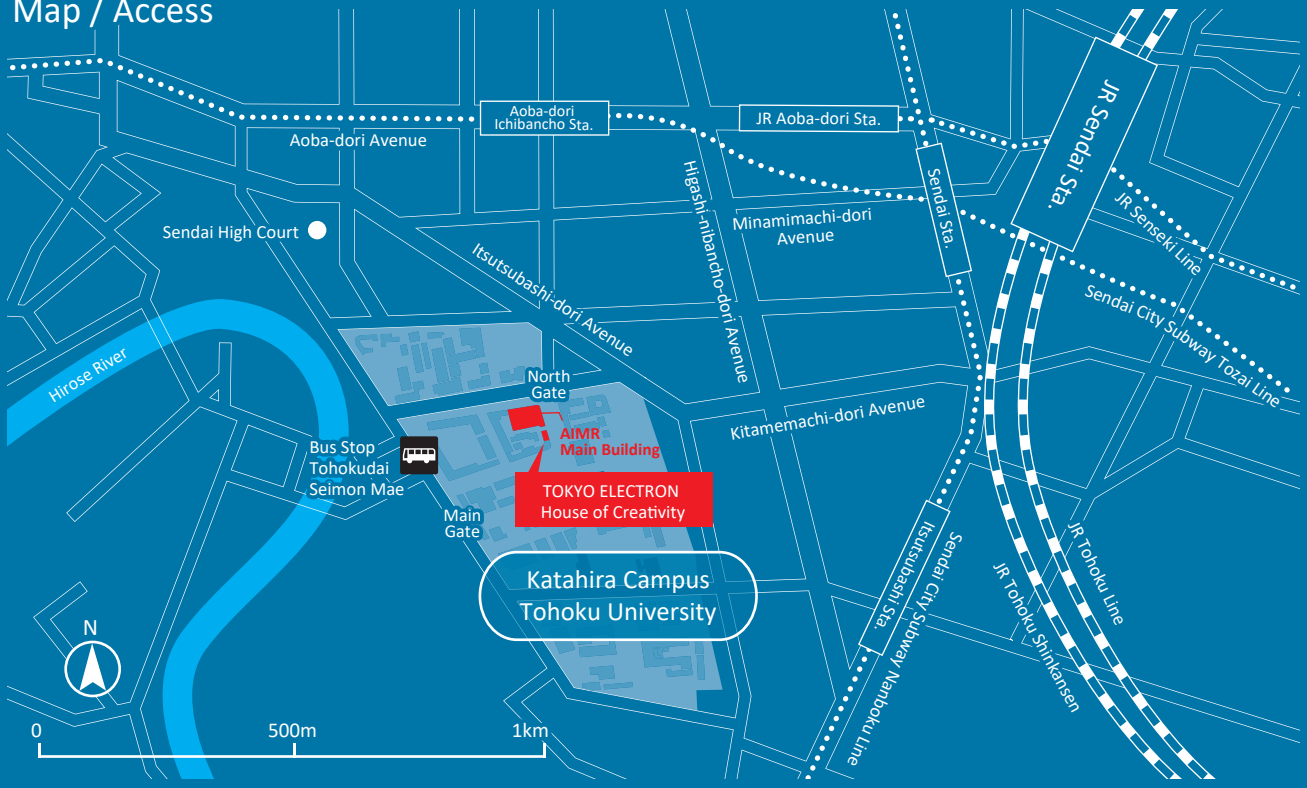
The Research in Industrial Projects for Students (RIPS) program held at UCLA's Institute for Pure & Applied Mathematics expanded in 2018 to include the g-RIPS-Sendai program. This initiative was launched by Tohoku University's Advanced Institute for Materials Research in collaboration with IPAM, targeting graduate students in mathematical science and related fields. The program includes a cross-cultural collaboration between participants from the U.S. and Japan, who work on industrially-designed research projects. These projects, which provide intellectually stimulating challenges blending mathematical and computational work, hold significant interest for the industrial partners involved.

Other Activities | January 24, 2024

[Sendai Foundation for Applied Information Sciences × Tohoku Forum for Creativity Collaborative Program] Sendai Round–table Talk "Creating a new IT industry from Sendai"

For Japan's future society, it is an urgent issue to break away from the concentration of resources in the Tokyo area and to revitalize the local economy. Specific proposals for regional revitalization in the Tohoku region, including Sendai City, are expected. At this Sendai Round–table Talk, we discussed the creation of new industries through collaboration between industry, government, and academia, such as IT and semiconductors.

Map / Access



From Narita Airport

Narita Airport Sta. — Airport Terminal 2 Sta.
- Narita Sky Access Line, Approx. 60 min. → Ueno Sta. → Tohoku Shinkansen, Approx. 95min. → Sendai Sta.
- Narita Express, Approx. 60 min. → Tokyo Sta. → Tohoku Shinkansen, Approx. 100 min. → Sendai Sta.

From Haneda Airport

Haneda Airport Sta. → Keikyu Line, Approx. 20 min. → Shinagawa Sta. → Yamanote Line, 11min. → Tokyo Sta. → Tohoku Shinkansen, Approx. 100 min. → Sendai Sta.

Haneda Airport Terminal 2 Sta. → Haneda Airport Terminal 1 Sta. → Tokyo Monorail, Approx. 20 min. → Hamamatsucho Sta. → Yamanote Line, 6min. → Tokyo Sta. → Tohoku Shinkansen, Approx. 100 min. → Sendai Sta.

From Sendai Airport

Sendai Airport Sta. → Sendai Airport Access Line, Approx. 25 min. → Sendai Sta.

From Sendai Sta.

By taxi : Approx. 10 min. by taxi from the West Exit on the first floor of Sendai Station
By foot : Approx. 15 min. walk from the West Exit of Sendai Station

From Aoba-dori Ichibancho Sta.

By foot : Approx. 10 min. walk from the South 1 Exit of Aoba-dori Ichibancho Station

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