

GLOBAL FACILITY CENTER

HOKKAIDO UNIVERSITY



GLOBAL FACILITY CENTER

Global Facility Center
Creative Research Institution, Hokkaido University
<https://www.gfc.hokudai.ac.jp/>



Global Facility Center

GFC's Mission

Our mission is to make maximum use of the advanced devices and technology the university possesses, in order to provide a better research environment for researchers.

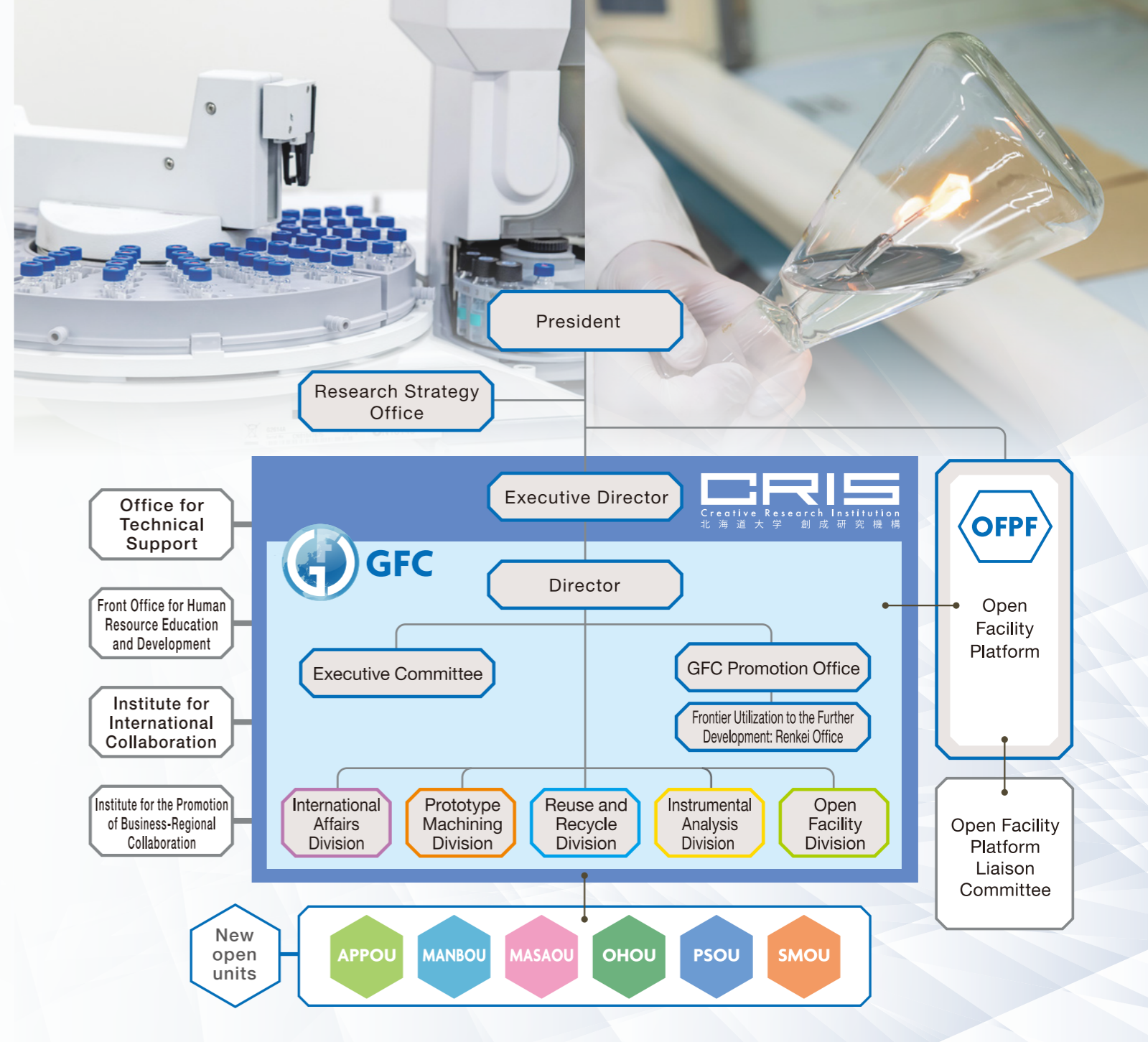
GFC's Value

In addition to providing the devices and technology needed for research, we are providing new value, which can be produced by sharing equipment.

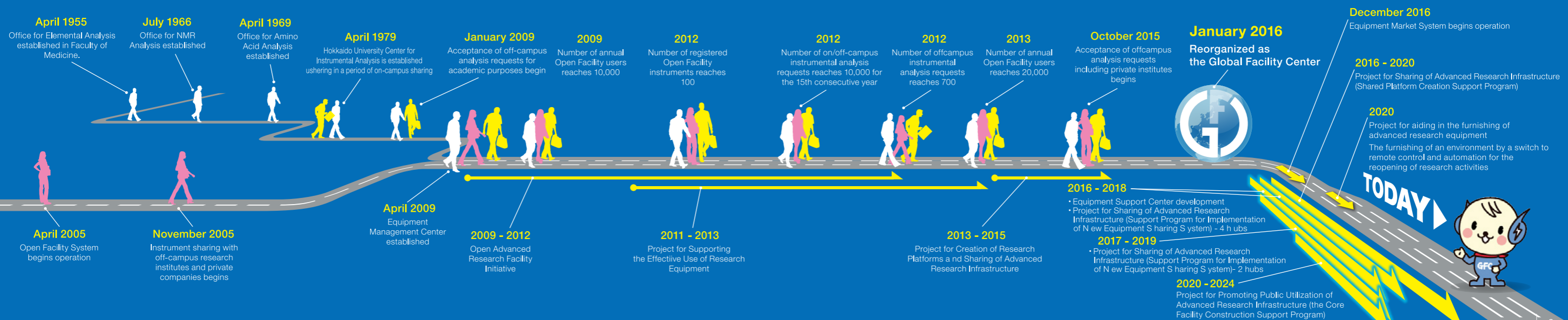
About the Global Facility Center

The mission of the Global Facility Center (GFC), located in the Creative Research Institution of Hokkaido University, is to support the progress of education and research for researchers and students both inside and outside the university by promoting the enhancement of functionality and openness in the advanced research equipment and devices owned by Hokkaido University and the technical capabilities of its technical staff in advanced instrumental analysis and forming processes. The GFC is composed of five divisions: Open Facility Division, Instrumental Analysis Division, Prototype Machining Solution Division, Reuse and Recycling

Division, and International Affairs Division. Its staff, which include two faculty members, seven full-time technical experts, nine part-time technical experts, and five clerical staff, responds to user's various requests and is advancing toward the provision of higher quality one-on-one technical support services. The GFC also exercises general control over the "Open Facility Platform," a network connecting 23 equipment sharing sites managed by the 16 departments on campus, and contributes to the smooth implementation of the strategy to strengthen the infrastructure for educational and research facilities pursued by Hokkaido University.



History of the GFC





Greetings from the Director

For the past 15 years, Hokkaido University has been promoting the construction of a database for university equipment and devices and the development of a shared system (the Open Facility System) under a consistent policy led by the GFC (formerly the Facilities Management Center). The Open Facility began with 50 pieces of equipment possessed by three departments in the year after incorporation (the 2005 fiscal year), and as of today, the end of October 2020, it has evolved to 16 departments and 222 pieces of equipment, and the annual utilization time has also exceeded 120,000 hours and is exhibiting a trend towards further growth.

The GFC has also incorporated instrumental analysis as another important pillar of research support, providing instrumental analysis services where technicians are commissioned to perform mass spectrometry, elemental analysis, and amino acid/protein analysis, and deliver the data to researchers. At present the technicians undertake more than 6,000 measurements and analyses per year and support more than 300 researchers. Ever since the establishment of the Office for Element Analysis in the Pharmacology Department of the Faculty of Medicine in 1955, this support work has spun out a history of development and research of various analysis technologies as well as human resource development. Today, it has gained the trust of many users. It is with great pleasure that we see these steady activities recognized and four technical specialists of the Instrumental Analysis Division received the “Outstanding Support for Research Award” in the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology in 2020. This award was a huge encouragement not only to the award-winning staff, who have always devoted themselves to their work with the motto of “becoming good partners by being there for each and every researcher,” but also many others who engaged in the university’s research support work.

In addition, for the Prototype Solutions Project (open outside the university based on industry–university collaboration in molding and machining technology), which was established four years ago in an effort to seek out new possibilities, the number of requests from outside the university exceeded 69 cases, and the cumulative revenue has surpassed 10 million yen, with rapidly growing results. Similarly, the Equipment Market



Hiroshi Amitsuka, Director
Global Facility Center
Creative Research Institution, Hokkaido University

Project, which promotes the reuse of secondhand equipment and devices, continues to develop as an aid for supporting young researchers.

This year marks GFC’s fifth since its launch. On the occasion of this milestone, we have sorted out the issues that have become apparent through our past efforts and have taken a new step toward the future. One is the construction of an evidence-based research infrastructure maintenance system that allows universities to make decisions on research infrastructure from a managerial perspective. Another task is to work with the Office for Technical Support, and to create a system to effectively train technical support personnel in conjunction with the operation of the shared facilities and equipment. The goal is to strengthen the opportunities to contribute to the improvement of the research capabilities of the university by raising the skill level of technicians. We are availing the support of the Ministry of Education, Culture, Sports, Science and Technology’s “the Core Facility Construction Support Program” We are, thus, striving toward the achievement of a future vision together with the staff. I ask for your continued guidance on these matters in the future as well.

The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology Outstanding Support for Research Award in 2020

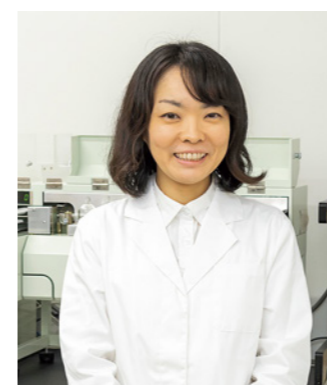


Seiko Oka, Division Director
Instrumental Analysis Division
Global Facility Center
Creative Research Institution
Hokkaido University

I am always in close contact with researchers and keep in mind the services that are available for any problems that arise. However, raising individual

skill levels, increasing system efficiency as well as teamwork, and the pooling of knowledge are indispensable to maintaining and continuing the maximum extent of research support with limited staff. We are deeply honored to have received such a splendid prize on this occasion for our analysis services in the university, which are being built up by trial and error since the era of the Instrumental Analysis Center.

The data we share are left eternally in the future, beginning with its independent spread as one part of research. We will continue to strive to responsibly deliver data suitable for global consumption. We continue to enjoy the support, joy, and appreciation of students and researchers, and feel deeply the attraction of a technical position in which we can contribute to a wide range of technical fields through everyone involved. From now on, we would like to contribute to conveying the attraction felt by technical specialists as well. I would like to thank all seniors and colleagues engaged in the Center’s work, and I will continue to do my best to meet your expectations in the future as well.

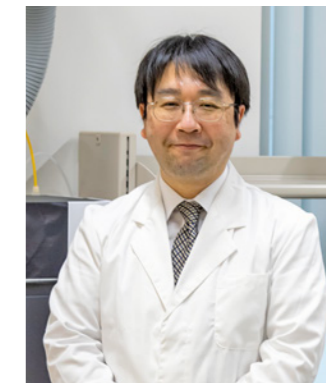


Ai Tokumitsu, Technical Staff
Instrumental Analysis Division
Global Facility Center
Creative Research Institution
Hokkaido University

I feel deeply honored as I receive such a splendid prize.

The receipt of this recognition and happiness is entirely due to the guidance of my seniors and the fact that I am blessed with competent colleagues. I would like to express my deepest gratitude to them.

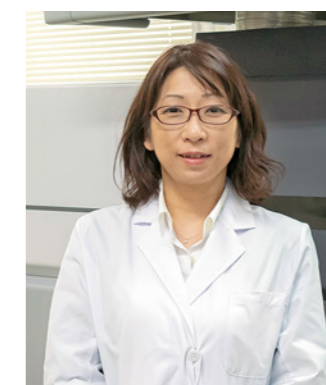
I will continue to do my utmost best to be of service to everyone involved in research support. Despite my imperfections, I hope that you will give me the benefit of your guidance in the future as well.



Tomohiro Hirose, Technical Staff
Instrumental Analysis Division
Global Facility Center
Creative Research Institution
Hokkaido University

On this occasion, the conferment of a public prize, the “Research Support Award” by the Minister of Education,

Culture, Sports, Science and Technology, is beyond what I personally deserve, and I am greatly moved by having the light shone on me as one member who has been steadily engaged in research support. The fact that I have been able to provide research support to date is due to the help of many people, including the staff with whom I work and the professors who have helped me in various ways. I will continue to strive to aim to provide better research support in the future.



Nozomi Takeda, Technical Staff
Instrumental Analysis Division
Global Facility Center
Creative Research Institution
Hokkaido University

On this occasion, receiving this splendid prize, the “Research Support Award” by the Minister of Education,

Culture, Sports, Science and Technology, is beyond what I deserve. While closely assisting researchers and students, I have exerted my best efforts while looking to contribute to major advances. I think that this prize not only reflects my efforts but is rather a recognition of all of my colleagues—full-time and part-time—who have shared their ideas with me. I will keep striving to ensure our concepts are handed down without interruption and can be of service.

Open Facility Division

— Furnishing a research infrastructure environment by an instrument sharing system that leads Japan —

About Open Facility

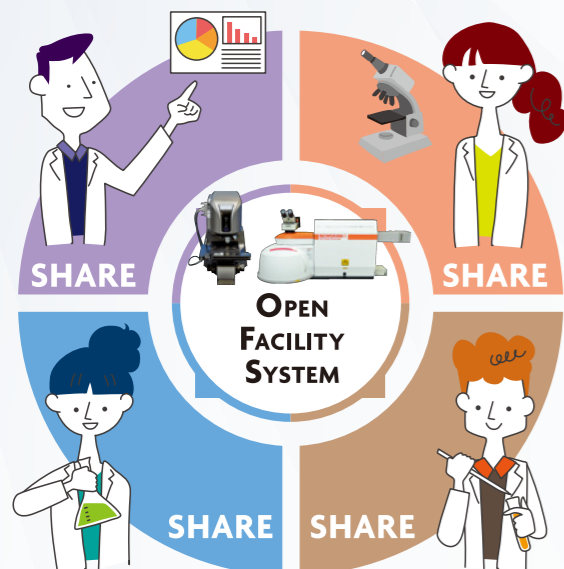
This division operates the “Open Facility System,” which controls the university-wide instrument sharing functions of Hokkaido University and provides an integrated management and operation system with over 200 installed research equipment.

A major feature of this system is sharing the devices supplied by each researcher within and outside the university. The device users pay a usage fee and can utilize the most advanced devices with their own hands.

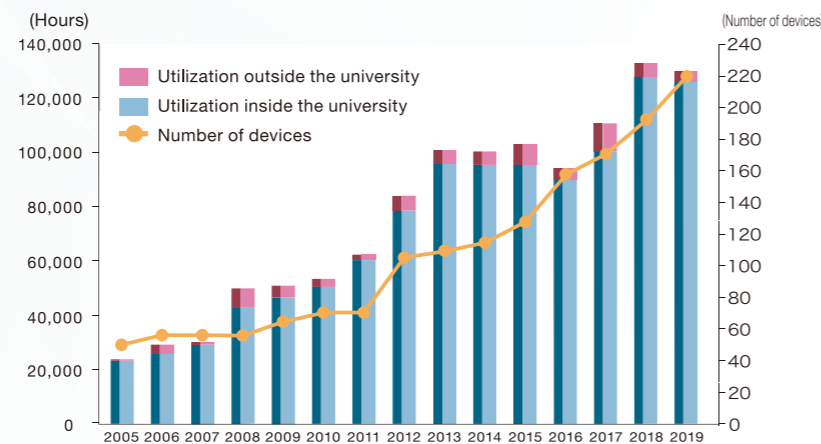
On the other hand, the usage fees are distributed to the device providers and can be allocated to the maintenance and management fees of the devices or to other research expenses.



The devices that have been registered in this system can be used by the faculty, students, researchers of this university, and anyone else, including researchers in other industries, academia and government. Those persons who are uncertain about the method of operation can attend training sessions or have a technical consultation; a solid support system featuring sophisticated technical abilities and rich knowledge has been put in place. Owing to such a unique system, the Open Facility is offering across-the-board support for users and staff’s research and development and is contributing to furnishing a sustainable research infrastructure environment.



■ The Time Utilization Results for the Open Facility System



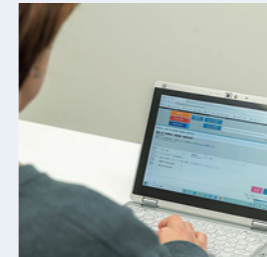
In the 2019 fiscal year, there were approximately 21,000 annual users, of which more than 400 were from outside the university. In the same year, the annual utilization time was approximately 120,000 hours, out of which more than 8,000 hours involved use outside the university.

Everything from applications for use of devices to confirmation of the usage fee can be done online

Steps for using Open Facility

STEP 1 Application for Use

You search for the device that you want to use on the reservation site of Open Facility and fill a use application. If there is anything unclear about the analysis, please feel free to consult the device administrator.



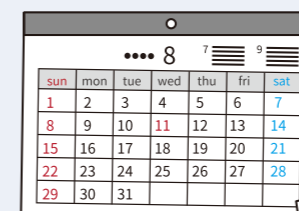
STEP 2 Initial training

After applying for initial training, adjust the schedule with the person in charge and you undergo training. You learn the rules of the facilities and how to use the instrument.



STEP 3 Instrument Reservation

Please reserve an instrument online.



STEP 4 Measurement

You operate the instrument by yourself and acquire data.



STEP 5 Confirmation of Use History

You can check the use history of an instrument, the payment fee, etc., online.

STEP 6 Reports of research results in articles

When you publicize the results of research, etc., that you undertook utilizing the Open Facility, we ask that you add an indication to that effect to the article, etc. Please see the website for examples of the text when adding such an indication and how to report to GFC.



Inquiries

Open Facility Division, Global Facility Center
Creative Research Institution, Hokkaido University

Telephone 011-706-9230
(Monday-Friday 8:30-17:00)

E-mail: shien@cris.hokudai.ac.jp

Open Facility website

<https://www.gfc.hokudai.ac.jp/system/openfacility/>



Analysis Services

Service item (as of October 2020)

- Elemental Analysis (organic)
- Elemental Analysis (inorganic) being prepared
- Mass Spectrometry
- Protein Sequencing
- Amino Acid Analysis

Who can use our services?

- Faculty members, students, researchers within campus
- People outside the campus who belong to universities, technical colleges, public research institutions, and engage in research and development
- Researchers who belong to private companies or facilities and engage in research and development that fits the purpose of our center

Instrumental Analysis Services for researchers

Solid Knowledge
Technical Consultation

Perfectly conditioned

Accurate and courteous with accumulated skills



Please use our techniques for your research!

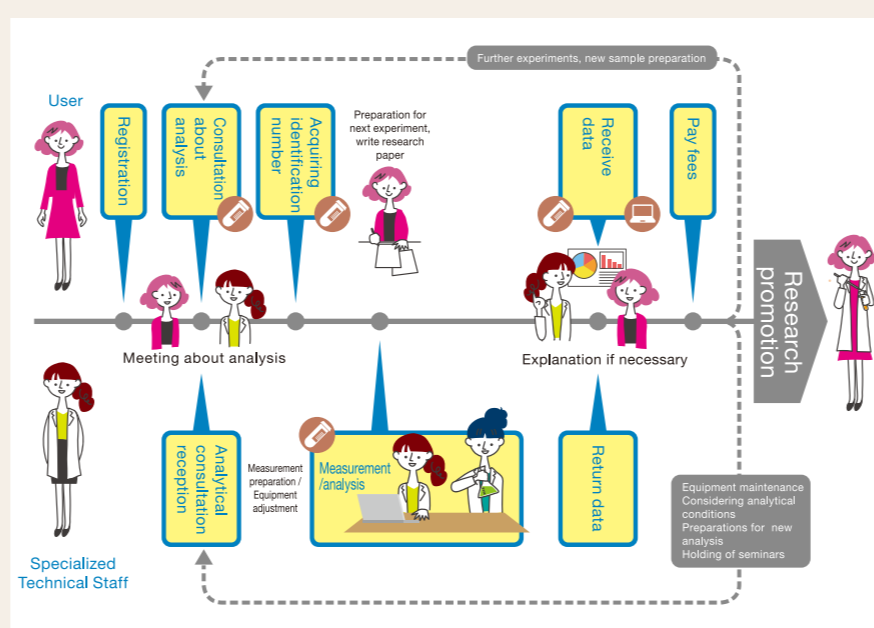
Since its establishment, the Instrumental Analysis Division has made it its mission to contribute to the development of education and research at Hokkaido University through developmental research of chemical analysis and analytical techniques, in addition to providing facilities for educational and research purposes requiring analytical instruments.

By sharing the analytical techniques we have cultivated over the years through research support work with other on and off-campus research support systems, we continue to help invigorate the research of large number of researchers.

We offer four main services: Mass Spectrometry, Element Analysis, Amino Acid Analysis, and Protein Sequencing. The 17 pieces of equipment currently installed on site are all operated under the supervision of specialized technical staff.

While making small adjustments when necessary for the needs of individual researchers, we continue to use the ideas and techniques inherited over the last +30 years to provide strong support to a large number of researchers.

Service flow



A word from our staff



あきらめず
 困難に立ち向かう姿勢
 絶やさずに
 増えていくみんなの絆と
 できること
 集まると自然と始まる
 ディスカッション
 研究の期待に応える柔軟性

Inquiries

Instrumental Analysis Division, Global Facility Center, Creative Research Institution, Hokkaido University

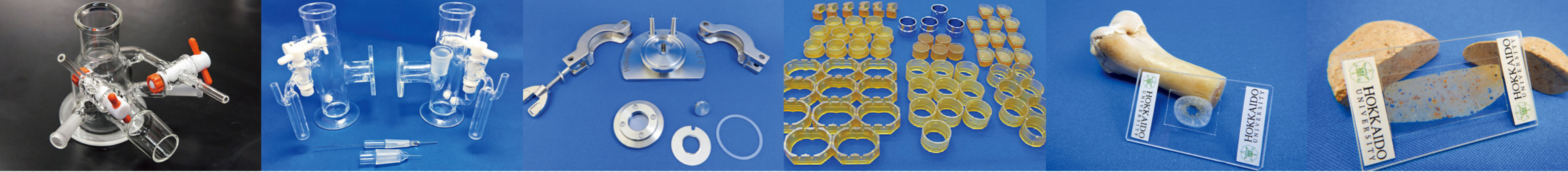
TEL 011-706-9235

E-mail : adm-iad@gfc.hokudai.ac.jp <https://www.gfc.hokudai.ac.jp/system/ias>

●For User Registration: TEL 011-706-9235 (Monday to Friday 10:00-16:30)
E-mail : adm-iad@gfc.hokudai.ac.jp

●For Payments: TEL 011-706-9570 (Monday to Friday 10:00-16:30)
E-mail : kaikei@research.hokudai.ac.jp

●For Analysis Services: Please use e-mail form in this division's website



Distinct Technical Abilities That Have Been Nurtured in Close Contact with Research

Prototype Machining Solution Division

Our purpose as technical staff is the strengthening and promotion of the education and research abilities of Hokkaido University. To that end, technical abilities and the ability to generate ideas that can respond to various needs are needed. It is precisely the experience gained through requested services and collaboration between technical staff members that are the sources of improved technical abilities.

Above all else, the fact that their own skills are deemed necessary is the "rewarding" of technical staff.

This is one of the new challenges that the university technical staff faces.

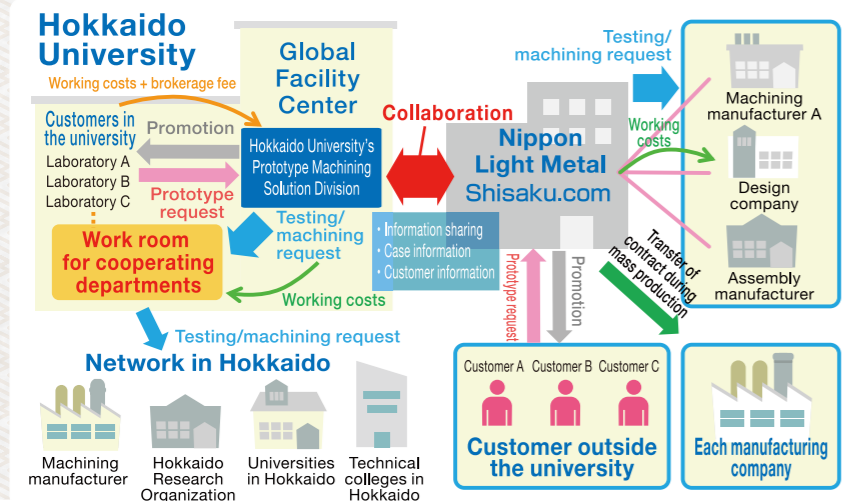


Technological improvement



Mechanical work

Technology inheritance



It is operated in cooperation with the Shisaku.com project by Nippon Light Metal Company, Ltd.



Glass working

The Prototype Machining Solution Division is promoting improvement in the morale of technical staff and developing venues where it can fully display the techniques possessed by university technical staff. This division is creating a new research support model in which technical staff earns operating expenses and nurtures themselves.

Human resource education and development



Thin section technique

Reuse & Recycle Division

The vast majority of university-owned equipment is small-to-medium sized devices priced at less than 5 million yen with 100-300 pieces phased out annually. For larger equipment, there are pieces that would function with only a single part, as well as devices that themselves are not broken but have a discontinued controlling computer that sit unused, collecting dust.

Before disposing of unwanted equipment and special components deemed unnecessary after the completion of a research project, why not set a price and sell it on the Equipment Market?* Also, please consider checking the Equipment Market first before buying any new items. This is the entrance to a “buying and selling” system from a “giving and getting” system.

▶ The “equipment market” targeting research equipment and devices

- Transfer for a charge is possible provided the conditions are in place
- The Global Facility Center is in charge



▶ The “stock house” targeting furniture and fixtures

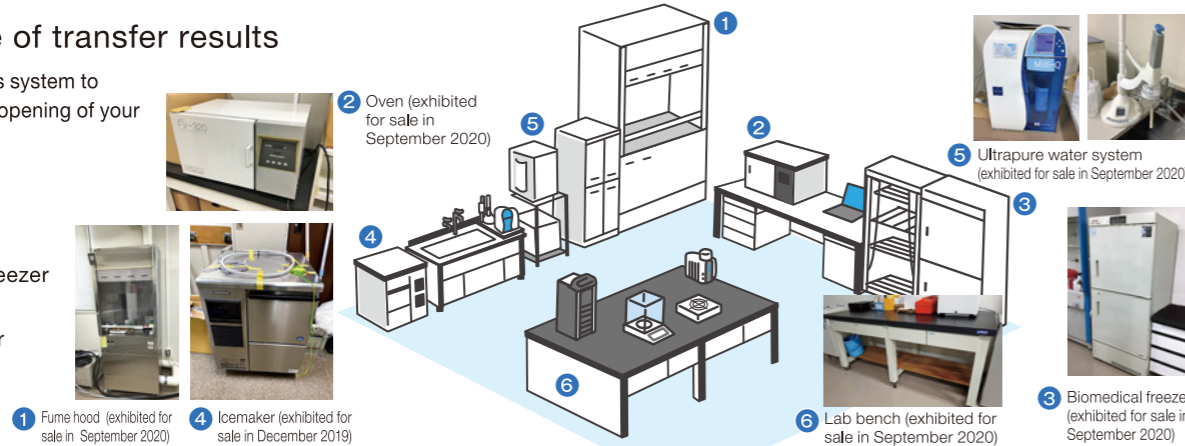
- Only free of charge transfer is possible
- The Asset Management Division of the Finance Department is in charge

*This system is limited to on-campus use at present. By promoting the recycling and reuse of small-to-medium sized equipment, we can lower the cost of research environment facilitation while contributing to efficient equipment investment planning and an increase in research options for young researchers.

▶ Example of transfer results

- You can use this system to prepare for the opening of your laboratory.

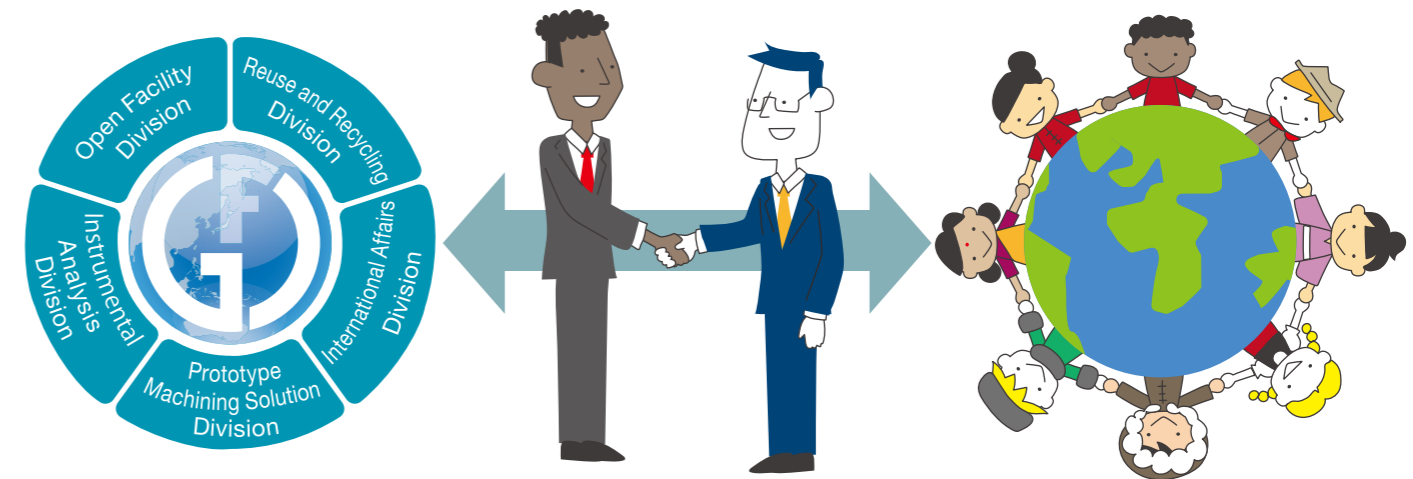
- No. Product name
- 1 Fume hood
- 2 Oven
- 3 Biomedical freezer
- 4 Icemaker
- 5 Ultrapure water system
- 6 Lab bench



International Affairs Division

In the International Affairs Division, our mission is to enhance and develop this center by adopting a global perspective. We are promoting the construction of a global network of shared equipment and devices and aiming for the exchange and the signing of agreements with foreign universities, in partnership with outstanding universities and research institutes overseas.

Moreover, we are also strengthening the infrastructure for educating and developing human resources for technical support, planning and implementing an educational curriculum at every level that makes full use of leading-edge equipment and devices and constructing a base for educating and developing human resources for innovation.



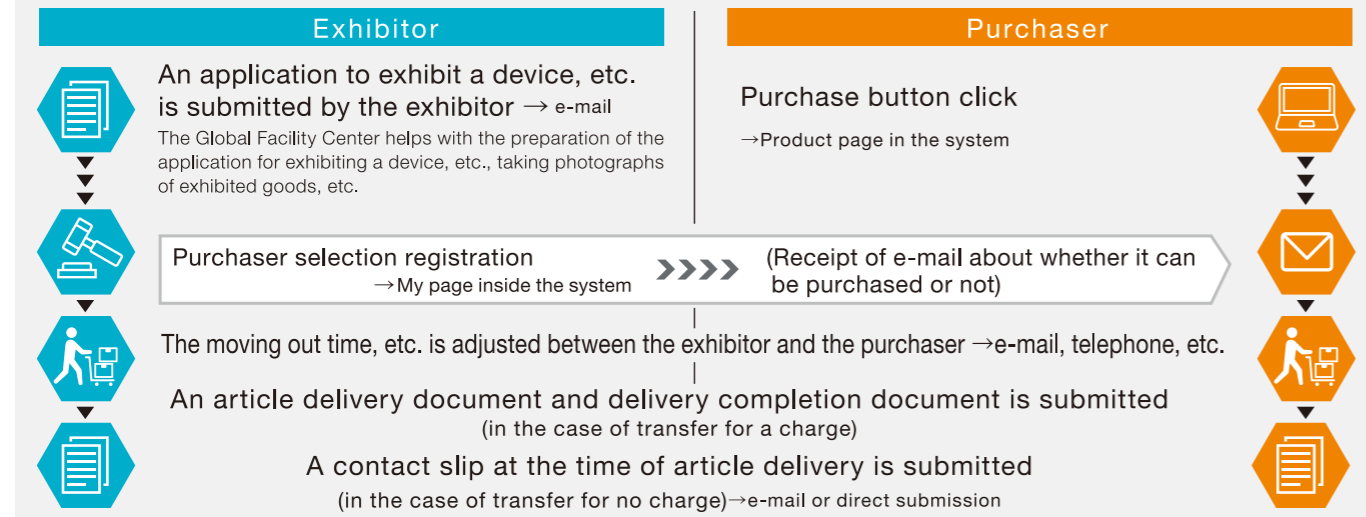
▶ Frontier Utilization to the Further Development: Renkei Office [FUTURE]

At FUTURE, we are tackling the challenges posed by new possibilities, such as the organic promotion of project sharing during advances due to collaborations between organizations beyond the framework of the organizations inside the university, formulation of proposals for advanced sharing systems, etc.



A transaction is completed by the following steps in the “equipment market,” whose target is research equipment and devices

* Please consult first with the person in charge of accounting (outlays) of the affiliated department, etc. about exhibiting goods in the stock house.



▶ Please use the “bulletin board” to exchange information about research equipment and devices or consumables.

Please use the “bulletin board” inside the system to solicit information about the research equipment and devices or parts that you are looking for, and as the place for searching for suppliers of consumables that are no longer needed because the research purpose has been achieved, etc.



* The “bulletin board menu” is a limited menu that is displayed after the SSOID login.

▶ University-wide Deployment of Equipment Sharing System at Hokkaido University

At Hokkaido University, we are aiming for the formation and university-wide deployment of a global platform for sharing research infrastructure by making open such things as the state-of-the-art equipment, with a view towards a “Hokkaido University that contributes to the resolution of the world’s problems,” which is cited in the third period Midterm Goals and Midterm Plans and the Near Future Strategy at the 150th Anniversary of Hokkaido University.

The university adopted the full proposal for six bases (fiscal year 2016: four proposals; fiscal year 2017: two proposals) that were selected inside the university by the Research Strategy Office, in the “**Project for Promoting Public Utilization of Advanced Research Infrastructure (Program for Supporting Introduction of the New Sharing System).**” We are promoting intensive reform of the system for sharing research equipment and devices. Even after the completion of this project, the GFC will continue to serve as the headquarter, and is working to strengthen the shared use system and cooperation among shared use units, mainly through the institutions participating in the Open Facility Platform (OFPF), which is a network of shared use units unique to each department.

* Research Strategy Office: One of the four Executive Director offices for planning and formulating proposals for key matters in university operation.

The model bases for equipment and device sharing (new open units)

Open Facility Platform (OFPF)

A “federated network for bases promoting equipment sharing” that connects the shared-use bases unique to the departments

General control organization: Global Facility Center (GFC)

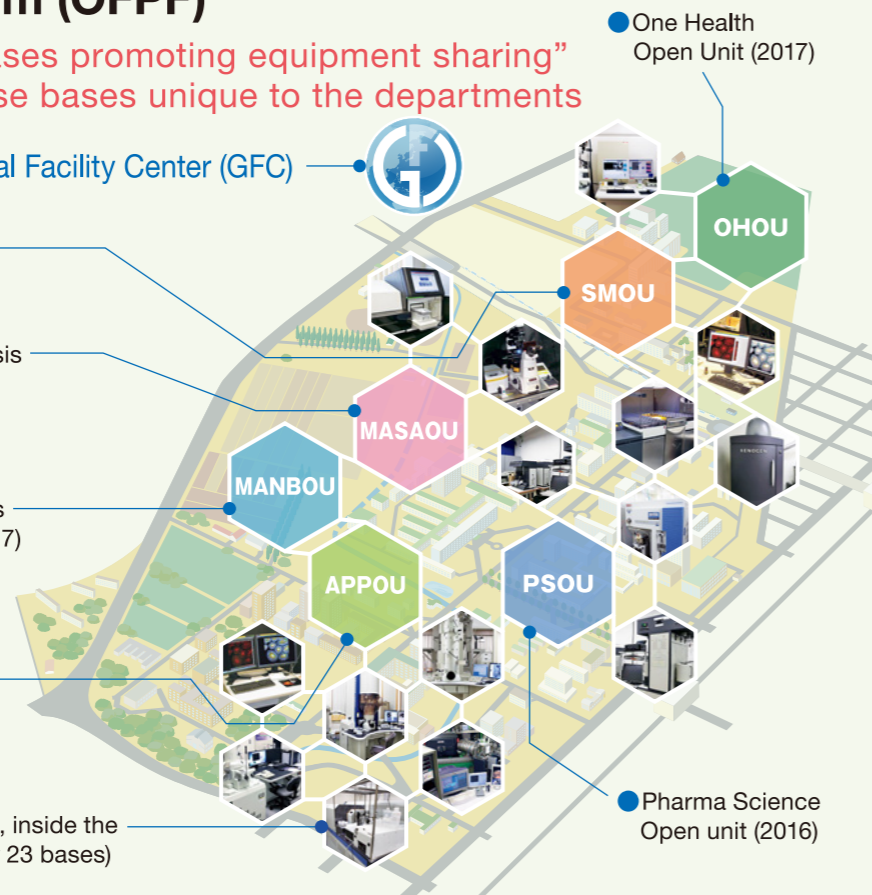
● Soft Matter Open Unit (2016)

● Materials Analysis and Structure Analysis Open Unit (2016)

● Microscopic Analysis for Nanomaterials Science and Bioscience Open Unit (2017)

● Advanced Physical property Open Unit (2016)

● Open units unique to departments, etc., inside the Hokkaido University campus (currently 23 bases)



Six adopted units serve as the model bases, accelerating university-wide equipment sharing.

- Each base open up its characteristic equipment and devices, and collaborate with the GFC
- Promote integrated open system operation in the university by sharing issues, etc. at the joint coordination committee and the steering committee of each unit.

Sharing of the “highly versatile, relatively large-sized equipment and devices” in the competitive research funds reform.

APPOU Advanced Physical property Open Unit

- Thermal/transport properties measurement system PPMS
- Magnetic properties measurement system MPMS3
- Multiple limit multi-nuclide NMR measurement system
- Mössbauer spectroscopy system
- NMR measurement system for multiple extreme conditions



Furnishing and operation of equipment and devices that are integrated with the management and research strategy of the research organization.

PSOU Pharma Science Open Unit

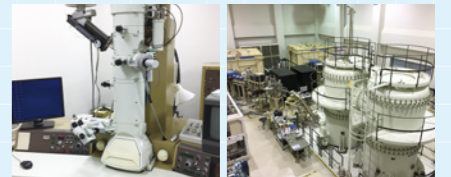
- Fully automatic screening device
- Isothermal titration calorimeter
- Surface plasmon resonance analyzer
- Cryo electronic microscope Glacios
- Cryo FIB-SEM Aquilos



Maintenance and updating of the research equipment and devices based on the notion of “sharing the burden of mutual aid.”

MANBOU Microscopic Analysis for Nanomaterials Science and Bioscience Open Unit

- Transmission electron microscope
- Focused ion beam processing device
- Composite quantum beam super high voltage electron microscope
- Scanning electron microscope
- AR ion polisher



MASAOU Materials Analysis and Structure Analysis Open Unit

- Powder X-ray diffraction apparatus for handling medium-low temperatures (XRD)
- 2D X-ray diffraction apparatus for thin film analysis (XRD)
- X-ray photoelectric spectrometer (XPS)
- Fourier transform infrared absorption light spectrophotometer (FT-IR)



OHOU One Health Open Unit

- Stable isotope MS (stable isotope mass spectrometer)
- Flow cytometer (with loader)
- Confocal laser microscope (upright type)
- Virtual slides



SMOU Soft Matter Open Unit

- 500 MHz NMR measurement device (cancer)
- Mass spectrometer (MALDI TOF/TOS MS)
- Mass spectrometer (MALDI TOF)
- 600 MHz NMR measurement device (Pegasus)



《Examples of Characteristic Efforts》



- Concentrated equipment in Joint Laboratory No. 6 for supporting international education (the Hokkaido Summer Institute) and a research start-up of invited foreign researchers (France, Portugal, South Africa) (OHOU).
- Constructed an **open system for efficient drug discovery devices** that connect the drug discovery steps (PSOU).
- Launched **commissioned services for preparing electron microscope specimens** for promoting utilization (MANBOU).
- Integrated equipment (the magnet system) in partnership with other universities, and developed **original options for measurements of current induced magnetization and ultrasonic physical properties under high pressure** (APPOU).
- Constructed a **system to accumulate and share among staff the knowledge required for measurement, maintenance** such as analysis examples, techniques, the state of devices, etc., using cloud service (MASAOU).

Organizations Participating in the Open Facility Platform



Office for the Promotion of Nanotechnology Collaborative Research
This office undertakes comprehensive research and development support from instrument utilization to technical consultations as the Hokkaido regional base for fine processing and fine structure analysis of the Ministry of Education, Culture, Sports, Science and Technology's "Nanotechnology Platform" project.

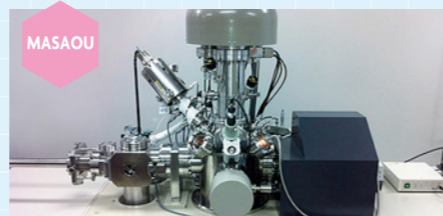
<http://www.cris.hokudai.ac.jp/cris/nanoplat/>



Nikon Imaging Center

This center was established as a biology microscope facility through collaboration with many corporations. It has an onsite full-time staff, and anyone in Japan or a foreign country can use it irrespective of whether it is a university, general corporation, etc., so long it is for research, development, or educational purposes.

<http://nic.es.hokudai.ac.jp/>



Laboratory of XPS analysis

Surface analyzers for solid specimens, including X-ray photoelectric spectrometers, Auger electron spectrometers (equipped with EBSD), SEM (equipped with ESD, with a low vacuum mode), ion milling apparatuses for cross-sectional analysis, AFM and laser scanning confocal microscopes, are operating.

<https://xpslab.eng.hokudai.ac.jp/>



Imaging platform

This platform is expanding industrial use in the space science field and a wide array of other fields such as life science. Imaging that had been impossible to date is enabled by "doping" the sample whose stable isotope element you want to investigate.

<http://www.imaging-pf.jp/>



Institute for Catalyst

This Institute was preceded by the Research Institute for Catalysis, established in 1943, and became an organization for nationwide joint utilization in 1989. It has TEM, SEM, EDS, XPS, NMR, and adsorption apparatuses that analyze catalysts and is an active base for catalyst research all over the world.

<http://www.cat.hokudai.ac.jp/>



Central Institute of Isotope Science

This center is a joint education and research facility for radiation and isotopes and is equipped with shared equipment and devices such as radiotherapy apparatuses, PET, SPECT and CT apparatuses for small animals and mass spectroscopy imaging apparatuses, as well as a training room, an open lab and so on.

<https://www.hokudai.ac.jp/radiois/>



Research Institute for Electronic Science

This shares a clean room and high-resolution STEM, etc., and is an active base for a variety of joint research that use a system of five pillars comprising four divisions: "Optical Science," "Materials Science," "Life Science" and "Mathematical Science," and the "Green Nanotechnology Research Center."

<https://www.es.hokudai.ac.jp/>



Multi-Quantum Beam High-Voltage Electron Microscope Laboratory

This laboratory participates in projects such as the "Nanotechnology Platform" and the "Inter-University Joint Research Centers of HVEM" along with cooperating in educational and research activities as a university-wide joint use facility. It is also promoting joint research by both Japanese and foreign researchers.

<https://labs.eng.hokudai.ac.jp/labo/carem/hvem/>



Laboratory of Nano- Micro Materials Analysis

This laboratory has Field Emission Scanning Microscopes (FE-SEM, CTEM), Field Emission Electron Probe Micro-analyzer (FE-EPMA, XRF, micro-raman), 3D visualization devices (FIB-SEM), and observation and diagnosis of metals, ceramics and biomaterials from bulk to nano and micro size can be performed.

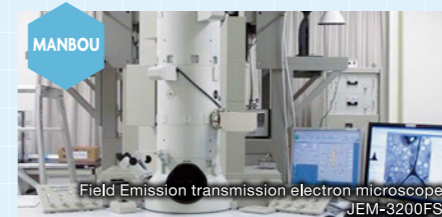
<https://facilities.eng.hokudai.ac.jp/nma/>



Liquid Helium Center

The Physics Department of the Faculty of Science introduced a helium liquefaction apparatus and nitrogen liquefaction apparatus in 1964. After that, it became a joint utilization facility inside the university. In 1995, the Liquid Helium Center relocated these at the completion of the joint experimental building of the Faculty of Science and they remain there till today.

<http://phys.sci.hokudai.ac.jp/SCLNLH/>



Electron Microscope Laboratory

This laboratory is a joint facility of the Research Faculty of Agriculture, the Graduate School of Agriculture and the School of Agriculture. Observation apparatuses, such as transmission and scanning electron microscopes and confocal laser microscopes, peripheral devices for specimen preparation, spectroscopic analysis apparatuses, etc., have been installed in it.

<http://lab.agr.hokudai.ac.jp/emlab/>



Open Facility Division Global Facility Center

The Open Facility is a system that lets researchers inside and outside the university to utilize sophisticated research equipment owned by the university. The 37 pieces of equipment registered are managed and operated by this division.

<https://www.gfc.hokudai.ac.jp/system/openfacility>



The High Brilliance X-ray Laboratory

This laboratory is equipped with pre-session and Lang camera in addition to an enclosed tube and a rotating target X-ray generator, a powder diffraction meter and single crystal 4-axis diffraction meter. It is a university-wide joint use facility where a wide range of X-ray diffraction experiments are possible.

<http://wcp-ap.eng.hokudai.ac.jp/hbxi/>



Earth and Planetary Solid Matter Analysis System Laboratory

At this facility, nano-scale tissue analysis by an electron microscope, bulk analysis and isotope analysis by fluorescent X-rays and a mass spectrometer, with the target being solid specimens, can be performed.

<https://www.sci.hokudai.ac.jp/grp/epsm-room/epsm-room/epsm-index.html>



Institute for Genetic Medicine

This institute has been certified as the "Advanced Research base for Infectious Cancer That Occur Due to Persistent Infections by Bacteria or Viruses," a base for joint utilization and joint research. An office for promoting joint utilization and joint research has been established to promote joint research.

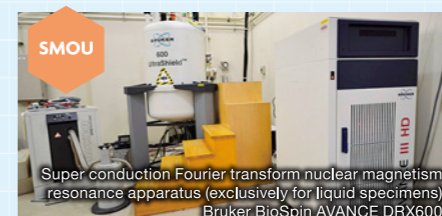
<https://www.igm.hokudai.ac.jp>



Instrumental Analysis Division Global Facility Center

We offer four main services: Mass Spectrometry, Element Analysis, Amino Acid Analysis, and Protein Sequencing. The 17 pieces of equipment currently installed on site are all operated under the supervision of specialized technical staff.

<https://www.gfc.hokudai.ac.jp/system/ias>



NMR Facility

This facility is composed of liquid NMR apparatuses of the Frontier Research Center for Advanced Material and Life Science, the Faculty of Advanced Life Science and the liquid and solid NMR apparatuses of the Graduate School of Science and the Joint Use Experimental Building.

<http://altair.sci.hokudai.ac.jp/facility/nmr/>



High-Resolution NMR Laboratory

This is a joint use facility for the NMR installed the Joint Use Experimental Building in the Graduate School of Science. It accepts measurement requests from all of Hokkaido University and other universities and public research institutions.

<http://altair.sci.hokudai.ac.jp/gnmr/>



Central Research Institute, Graduate School of Dental Medicine

This is a joint utilization facility of the School of Medicine and the School of Dentistry. In addition to installing experimental apparatuses with high public character, such as MRI, electron microscopes and next-generation sequencers, it also offers space for experiments. It is widely used by researchers in other faculties as well.

<https://core-research-facilities.med-hokudai.jp>



Center for Research and Education on Drug Discovery

This center promotes screening for low molecular compounds in intractable disease targets obtained from basic research. It is one of the six nationwide bases of the Ministry of Education, Culture, Sports, and Science and Technology's "The Leading-edge Research Infrastructure Program Compound Library Center."

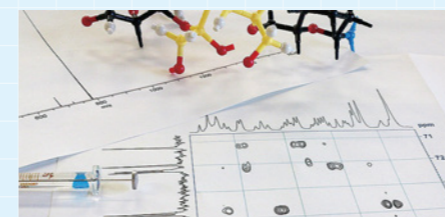
<https://japanese-apricot.pharm.hokudai.ac.jp/>



Health Innovation Center

This center was established inside the Graduate School of Health Sciences for joint industry and university research on health science. The mass spectrometers (Fourier transform, ion traps, quadrupole), atomic force microscope, isothermal titration calorimeter, etc. are chiefly used for lipid research.

<https://www.hs.hokudai.ac.jp/innovation/>



GC-MS & NMR Laboratory

This is a joint use facility of the School of Agriculture. It accepts MS and NMR analysis requests and apparatus use of NMR from the university. MS is equipped with FD-MS by a self-made emitter, and the NMR is equipped with a probe for micro-specimens.

<http://lab.agr.hokudai.ac.jp/ms-nmr/>



One Health Open Unit

This unit provides highly open devices as a site for research and education on veterinary medicine, which contribute to the achievement of "One Health." It features active joint research involving not only Japan but also foreign countries, and a wide array of research from the molecular level to individual animals and the field level.

<https://www.vetmed.hokudai.ac.jp/>

The basic concept of the Open Facility Platform is the provision for a shift to a one-stop service in equipment and device utilization by undertaking the efficient use of shared devices and the strategic disposition of the advanced devices of this university and giving full play to a powerful coordination function.

The Concept of the Hokkaido University Core Facility

Our application was accepted for the “Project for Promoting Public Utilization of Advanced Research Infrastructure (the Core Facility Construction Support Program)” by The Ministry of Education, Culture, Sports, Science and Technology in 2020. The project period is to last for five years (FY 2020-2024).

The project will support efforts to strengthen (by creating a core facility) the system for introducing, updating and sharing equipment and devices that are being managed by each research organization, such as faculties and graduate schools, as research infrastructure for the entire research organization. In fiscal year 2020, there were applications from 34 institutions. Five of these applications were adopted.

The project will be promoted by the “Core Station for the Management of Open facility and Skills (CoSMOS), which is composed of the Global Facility Center, Creative Research Institution and the Office for Technical Support.

Efforts and Issues to Date

Making the advanced research equipment open

- 2005: Start of equipment sharing
- 2015: Establishment of the Global Facility Center (GFC) 222 pieces of registered advanced equipment (16 departments, 120,000 hours/year) 6,000 cases of commissioned analysis with a total revenue of 43 million yen/year
- Opening of molding and machining technology (prototype solutions)
- Circulation of secondhand devices inside the university (equipment market)
- Department collaboration: Creation of the Open Facility Platform (OFFP)
- Enhancement of functionality of the six open units due to the Ministry of Education, Culture, Sports, Science and Technology’s “New Shared Use Project”

Issues

As a consequence of the growth on a university-wide scale, the stage for revising the respective roles of equipment managers, departments and university executive in sustained operation has been reached. **The establishment of a system for the sustained collection and analysis of research infrastructure data** is a necessity.

Education and training of human resources for research support

- 2006: The Office for Education and Research Support (2013: Office for Technical Support) was founded; 2018: Centralized management of technology and staff
- The technical staff of the entire university began serving jointly in the Office for Technical Support
- Skill sharing by grouping by specialty
- Operation of the university-wide support system beyond departments
- Support for the independent activities of technical staff
- 2020: Receipt of the “**Outstanding Support for Research Award**” in the **Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology**

Issues

The furnishing of the organization is progressing steadily. The stage for accelerating substantive centralization has been reached. **The strengthening of management functions and information sharing and transmission functions** as well as **the establishment of a financial infrastructure** for activation of cross-departmental activities is essential.

Five years from now, the Hokkaido University Core Facility aims to establish a system to promote the strengthening of the EBPM research infrastructure to support the sustainable generation of achievements and their return to society.

1

Construct a research infrastructure IR function, and furnish a “research infrastructure management cycle.”

2

Thorough going strengthening of the OFFP* (the open infrastructure inside the university) around the horizontal deployment of the new shared-use project.

3

Strengthening of the education and development system for human resources for research support.

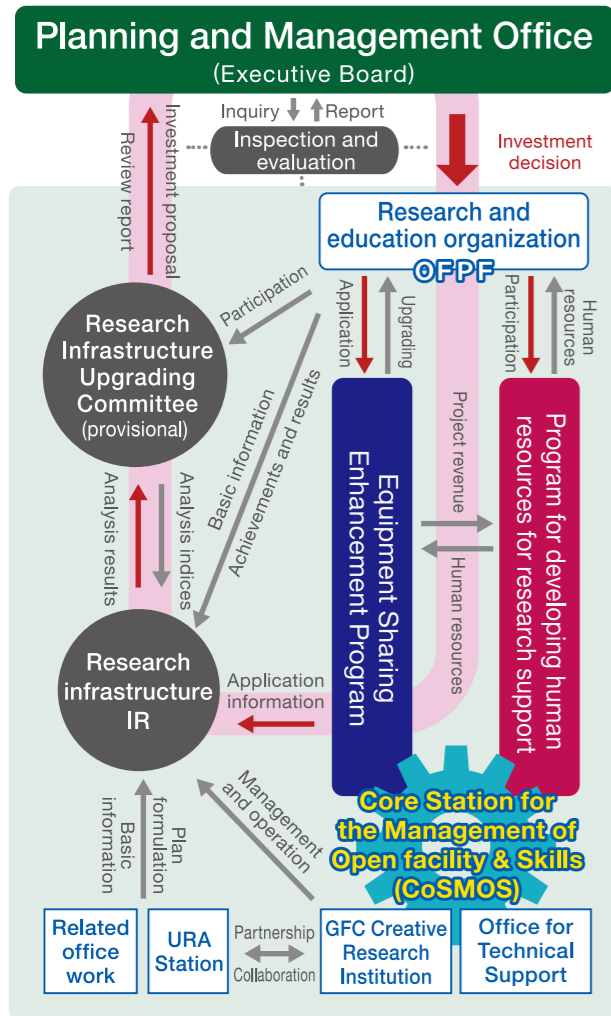
* OFFP... Open Facility Platform

Implementing institutions: Hokkaido University and the Japan Agency for Marine-Earth Science and Technology

Cooperating institutions: High Energy Accelerator Research Association (KEK), National Institute of Informatics (NII), Hokkaido Sapporo Kaisei Secondary School

1 Construction of a research infrastructure management cycle

We will build an IR system for the research infrastructure that consolidates detailed information on equipment sharing and is equipped with BI tools that enable multifaceted analysis functions. Based on the evidence obtained through the use of this system, the "Research Infrastructure Upgrading Committee (tentative)," consisting of faculty members of departments, will formulate an investment strategy for upgrading the facilities. Based on this, the university's executive board undertakes investment decisions, and the two programs will be implemented in tandem to establish a system for promoting the strengthening of the EBPM for research infrastructure.



Core Station for the Management of Open facility & Skills (CoSMOS)
A collaborative organization of the GFC and Office for Technical Support

2 Implementation of the equipment sharing enhancement program

Establishment of a sustainable equipment sharing system

Project for Promoting Shared Use through campus-wide recruitment **REBORN**

Research Equipment Boosting and Reusing Network project

Open Facility Platform (OPPF)

A network of shared-use units unique to each department

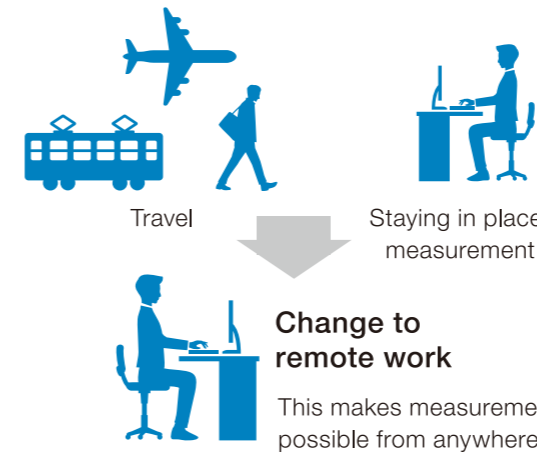


Research infrastructure IR Visualization of cost-effectiveness Rational investment determination

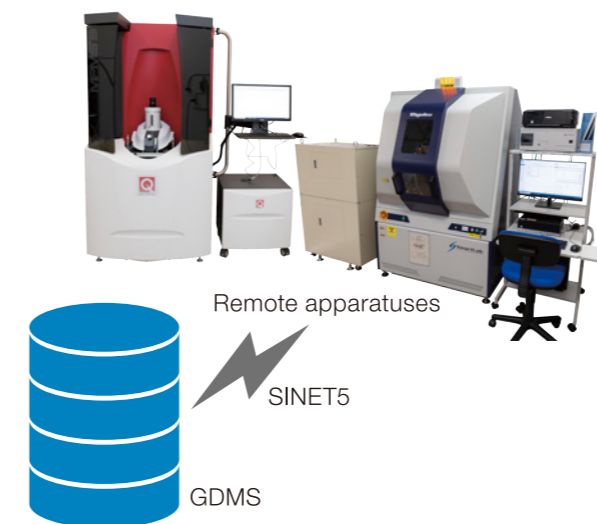
Furnishing of a robust research environment

Remote OF development project

Sharing regardless of physical distance



Furnishing of a data management environment + development for human resources for remote support



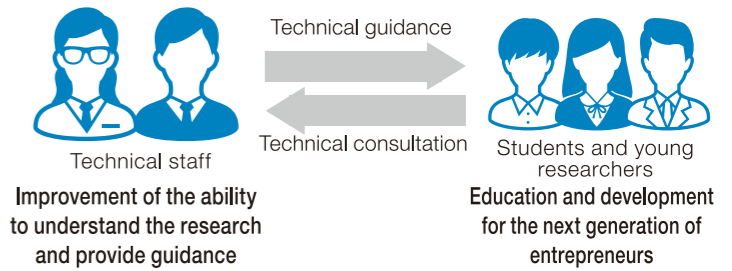
The aims are to enhance remote use to strengthen risk response and to improve research data management through collaboration with GakuNinRDM partnership, etc.

Risk tolerance × High efficiency × Borderless

Strengthening of innovation creation

The project for supporting manufacturing start-ups

Supporting entrepreneurship education with a variety of techniques

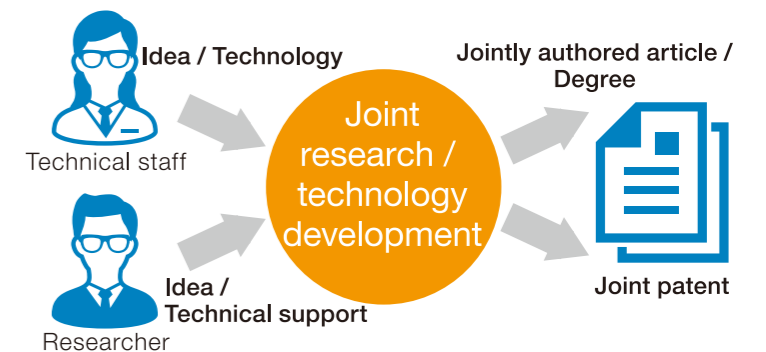


This is a new effort to fill the gap that exists between the fostering of entrepreneurship and the start-up of companies. It provides a site (the Start-up Garage) for manufacturing trials based on unfettered thinking, and promotes the social implementation of knowledge; not only research seeds but also the ideas of students.

Innovation creation + Development of human resources

R&T collaborative project

Creation of innovation opportunities by collaboration between faculty members and technical staff



The aim is the creation of career paths by promoting a change in the researchers' consciousness and strengthening technical development abilities as well raising technicians' research skills. * After the project is completed, the goal will be to switch to crowdfunding.

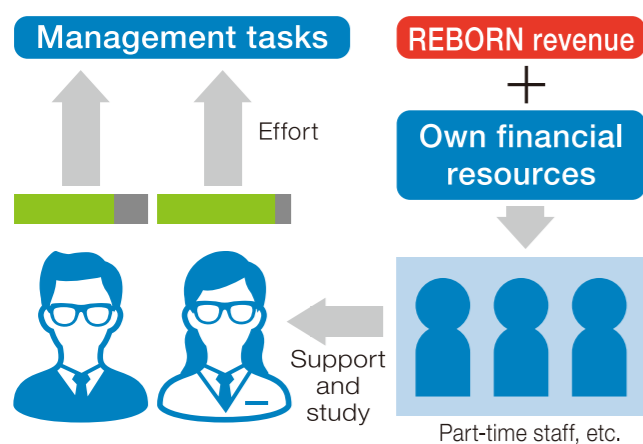
Innovation creation + Skill improvement + Formation of career paths

3 Strengthening of the system for developing human resources for research support.

Systematic human resource development

The project for developing human resources for research support management.

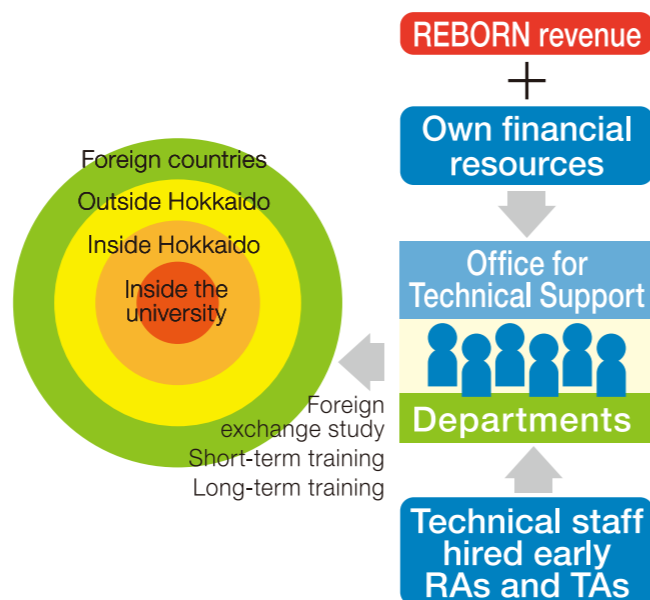
A concurrent work system that devotes the efforts to the management tasks.



The technical staff participate in the management of Office for Technical Support and Research Infrastructure Upgrading Committee, etc. by devoting their effort, and cultivate their management skills. In addition, part-time staff are hired to cover the allocated efforts.

Project for development of multi-skilled human resources

Study inside and outside the university and career formation

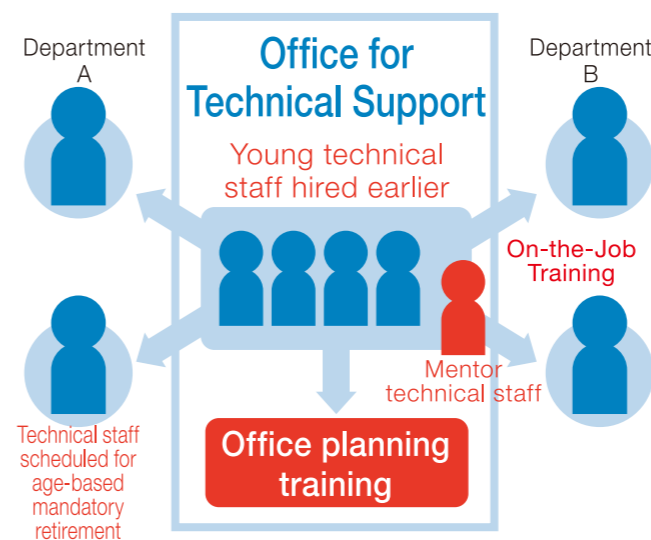


By sending technical staff inside and outside the university for training, we create opportunities for them to improve their skills and acquire multi-skills. This will be done in cooperation with various facilities within the university and universities and colleges of technology in the province, the Municipal Institute of Public Health, the Hokkaido Research Institute, the High Energy Agency, and JAMSTEC. We are also considering the use of the cross-appointment system and sending students overseas. The technical staff are dispatched for training inside and outside the university, thereby creating an opportunity for improving their skills and acquiring multiple skills. The application of a cross appointment system and dispatch to foreign countries are also being considered.

Systematic allocation of human resources and effective search for human resources

The Project for training young technical staff hired earlier

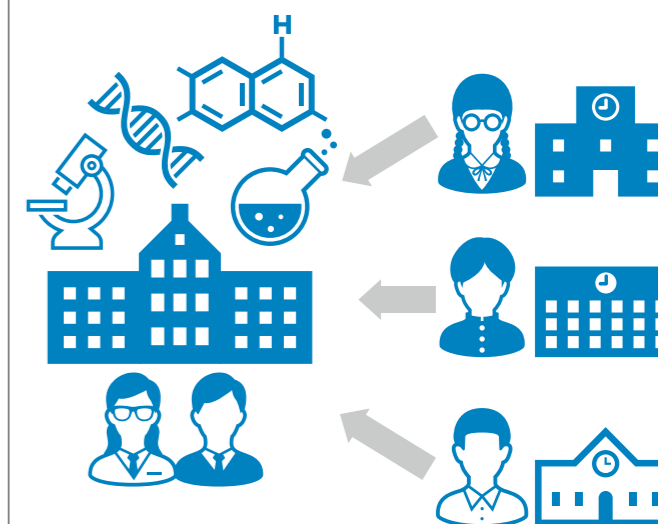
The staff hired ahead of schedule experience OJTs in multiple workplaces, and the mentors also grow.



In anticipation of retirement, young technical staff are hired and trained with the Office for Technical Support three to five years ahead of schedule. During the early hiring period, various OJTs are implemented in many workplaces. The newcomers' abilities are identified and those who are battle ready are hired as successors to the retirees.

The research support internship project

Teaching the attraction of research support



This project provides opportunities to experience research support work in the university in a variety of forms, with the targets being students of high schools, technical colleges, faculties, and graduate schools. It aims at ensuring outstanding human resources from a long-term perspective, and raising public familiarity with research support staff.

Technology sharing, transmission and inheritance

The project for strengthening summarization and public relations for research support information

In an effort to smoothly and effectively promote education and human resource development activities and raise the existential meaning of the technical staff and tie this to an improvement in morale, this project summarizes and makes visible university-wide research support skill information accumulated inside the university. It also issues a public relations journal in addition to the conventional web and SNS messages and conveys the activities of the research support staff to society. The Office for Technology Support and the URA Station will collaborate in the establishment of a Task Force for Research Support Public Relations (provisional) as the specialized organization for that purpose.

Specialist



Public relations magazine on human resources for research support in Hokkaido University

A4/published once a year
The real on-site voices are transmitted inside and outside the university

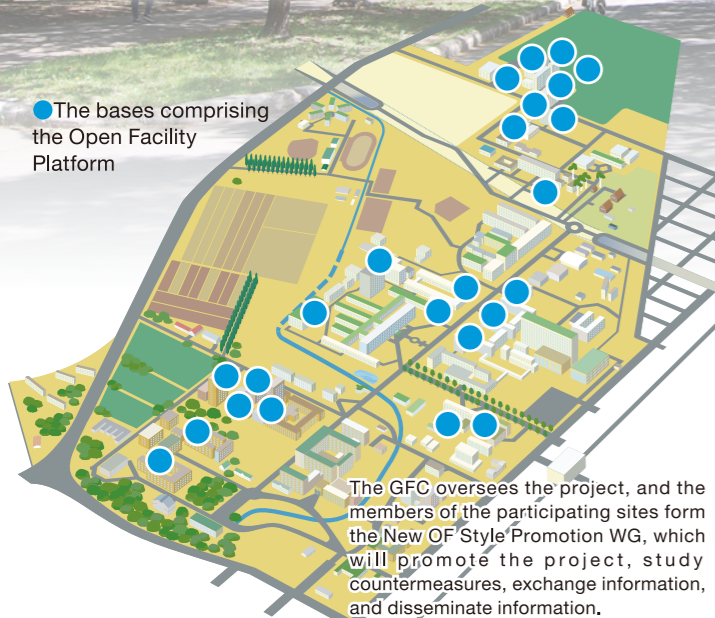


Hokkaido University Technology map

Skill data collection on research support
Containing the full appeal of both newcomers and experts!
Beneficial for both technology seekers and job seekers!
The collection summarizes and visualizes the university-wide research support skill information accumulated inside the university.

Project for aiding in the furnishing of advanced research equipment

The furnishing of an environment by a switch to remote control and automation for the reopening of research activities



Summary of the project to switch to remote and automated Open Facility of Hokkaido University

The numbers inside the red circle indicate the order of priority. In the parentheses are the numbers of young researchers, PD, graduate students, and undergraduate students who have been affected by the suspension of joint use of the applied equipment, and the faculty, technical staff, PD and graduate students engaged in its operation.

Creative Research Institution

Global Facility Center (GFC)

(Young researchers 20, PD 30, DC 20, MC 15, UG 10; engaged in operation: faculty 0, technical staff 3, PD 0, graduate students 0)

- Powder X-ray diffraction system ⑫
- * Switch to remote for operation and analysis

Research Institute for Electronic Science

Attached Green Nanotechnology Research Center

(Young researchers 8, PD 10, DC 22, MC 33, UG 10; engaged in operation: faculty 4, technical staff 3, PD 2, graduate students 3)

- Super-high-precision electron beam lithography system ①
- * Switch to remote for CAD preparation and operation
- Super-high-resolution scanning electron microscope ②
- * Switch to remote for screen analysis and operation
- Powder X-ray diffraction system ⑬
- * Switch to remote for analysis work

Faculty of Engineering

Microscopic Analysis for Nanomaterials Science and Bioscience Open Unit (MANBOU)

(Young researchers 5, PD 5, DC 10, MC 50, UG 20; engaged in operation: faculty 4, technical staff 5, PD 1, graduate students 0)

- High resolution 3D structure evaluation system ⑦
- * Switch to remote for control and analysis
- * Shortening of the work time due to increased speed of data acquisition

Materials Analysis and Structure Analysis Open Unit (MASAOU)

(Young researchers 14, PD 7, DC 22, MC 87, UG 108; engaged in operation: faculty 7, technical staff 6, PD 0, graduate students 4)

- Composite beam processing/observation apparatus ⑧
- Field emission electron probe microanalyzer ⑨
- Energy dispersive X-ray fluorescent spectrometer ⑩
- Field emission scanning electron microscope ⑪
- * Screen sharing and switch to remote for training and guidance

High Brilliance X-ray Laboratory

(Young researchers 1, PD 1, DC 6, MC 20, UG 0; engaged in operation: faculty 1, technical staff 1, PD 0, graduate students 0)

- Powder X-ray diffraction system ⑰
- * Switch to remote for operation and analysis
- * Shortening of the staying in place time by adding a function for exchanging 10 specimens

Laboratory of XPS analysis

(Young researchers 3, PD 7, DC 40, MC 40, UG 40; engaged in operation: faculty 1, technical staff 2, PD 0, graduate students 0)

- Field emission Auger electron spectrometer ⑱-1
- X-ray photoelectric spectrometer ⑱-2
- Low-vacuum scanning electron microscope ⑱-3
- * Screen sharing and switch to remote for training and guidance

Faculty of Science

Advanced Physical Properties Open Unit (APPOU)

(Young researchers 4, PD 0, DC 8, MC 32, UG 40; engaged in operation: faculty 11, technical staff 3, PD 0, graduate students 16)

- Thermal/transport properties measurement system ③
- Magnetic properties measurement system ④
- * Change to remote control, monitoring of apparatus operation by IP camera

Department of Earth and Planetary Sciences

(Young 0, PD 4, DC 3, MC 9, UG 2; engaged in operation: faculty 2, technical staff 6, PD 4, graduate students 12)

- Next-generation destructive optical tomography apparatus ⑳
- * Automatic sharing of images
- * Switch to remote for image analysis

Faculty of Advanced Life Science

High Resonance NMR Laboratory

(Young researchers 5, PD 10, DC 15, MC 40, UG 20; engaged in operation: faculty 6, technical staff 1, PD 3, graduate students 0)

- JEOL 600-MHz high-resolution NMR system ⑤, ⑥
- * Switch to remote for control and analysis
- * Automation of sample exchange and nitrogen filling

Institute for Genetic Medicine

Medical, Dental and Pharmaceutical Branch Office of Nikon Imaging Center

(Young researchers 6, PD 4, DC 10, MC 2, UG 1; engaged in operation: faculty 4, technical staff 3, PD 3, graduate students 2)

- Light sheet fluorescent microscope ⑬
- Super-high-resolution confocal microscope ⑭
- *In vivo* imaging system (IVIS) ⑮
- CT for small animals ⑯
- * Screen sharing and switch to remote for operation

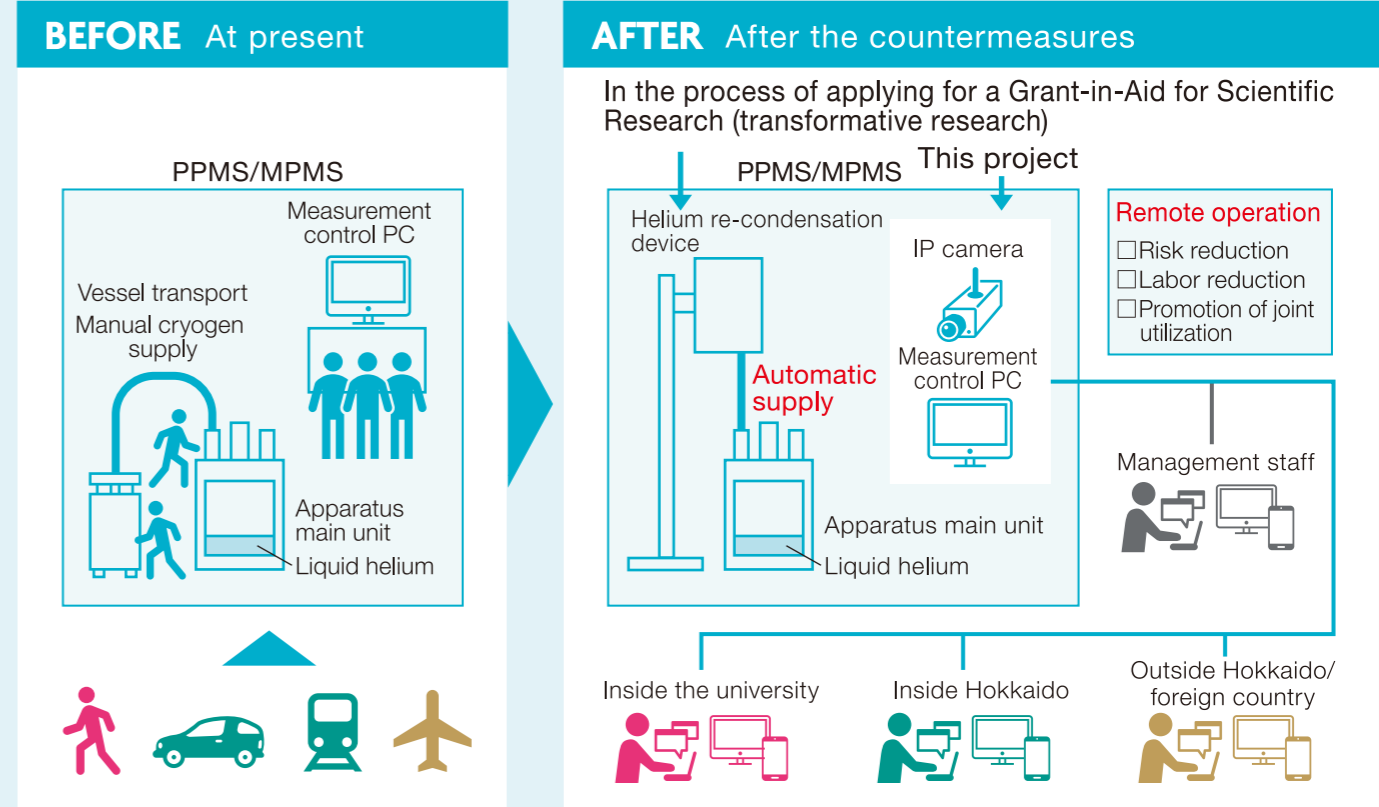
Examples of countermeasures: An automation and remote use of physical properties measurement system (PPMS) and magnetic properties measurement system (MPMS)

Concepts

- **Minimization of work involving face-to-face contact** by switching to remote for experimental support and experimental apparatus control and full automation of cryogen supply.
- Switching to remote use for the safety checking work of the laboratories and experimental apparatuses by introducing an IP camera with UPS (uninterrupted power supply).

Key advantages

- Not only can young researchers and graduate students continue their research, but also **the undergraduate student experiments, which have been the densest situation, can be continued.**
- **Significantly reduced risk of infection and labor** for equipment maintainers, including staff, technical assistants, graduate students, etc.
- **Further increase in joint utilization outside the university** owing to the facilitation of commissioned use services.
- **Further improvement of utilization rate and increase of academic output** through stable operation of joint use.



MPMS Results

	2017	2018	2019	2020 (April-May) → Annual conversion	2021 forecast
Hours of operation (h)	3,660	5,064	4,420	216	5,600
The number of users (persons)	336	444	440	27	600
Operating rate (%)	98	86	75	22	95
Sharing rate (%)	73	70	88	80	85

(5 departments inside the university, 8 institutions outside the university, 3 institutions in foreign countries)

26/26 (suspended from April 21 onward)

ACCESS

Access from New Chitose Airport


 JR (Express Airport): 40 minutes

 High speed bus: 70-80 minutes


JR Sapporo Station

 Taxi: Approximately 10 minutes


* Via "Kita 20-jo East Gate" from North Exit of JR Sapporo Station

 Chuo bus (Nishi 51, Nishi 71)
A bus ride of approximately 16 minutes
+ a walk of approximately 5 minutes

* Get off the bus at "Kita 21-jo Nishi 15-chome"

 Subway: A ride of approximately 3 minutes
+ a walk of approximately 20 minutes

* Get off the subway at the "Kita 18-jo" Station on the Namboku Line

 Intra-campus loop-line bus (no charge)
/ approximately 10-minute ride

* A walk of approximately 10 minutes from JR Sapporo Station to the front gate of Hokkaido University

Board a bus at the front gate of Hokkaido University
(in front of the Administration bureau)

→ Alight "in front of the Creative Scientific Research Building"

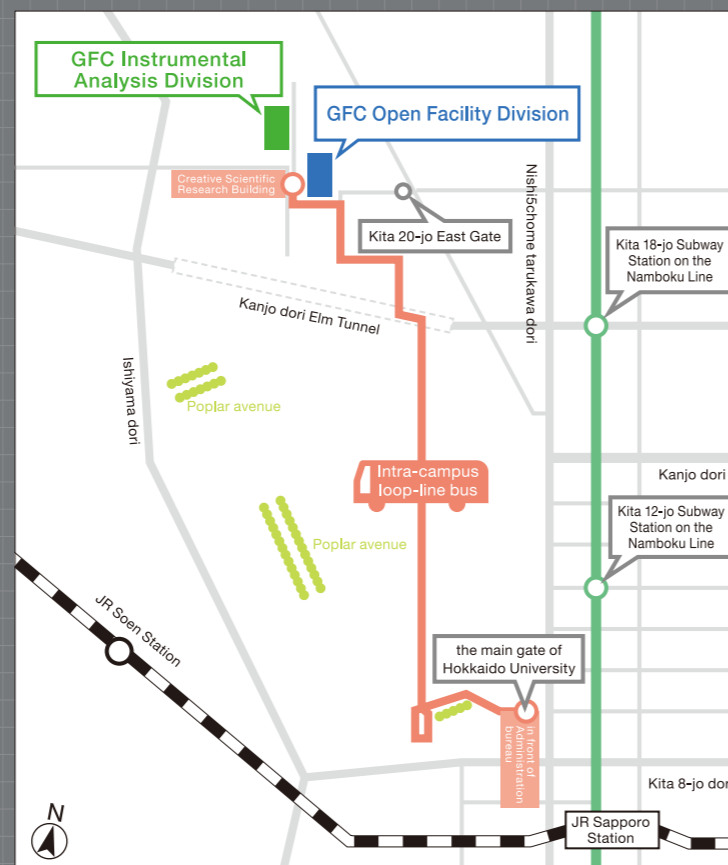
Creative Research Institution

* The intra-campus loop-line bus is operated between 8:20 and 20:30 in 10–15-minute intervals.

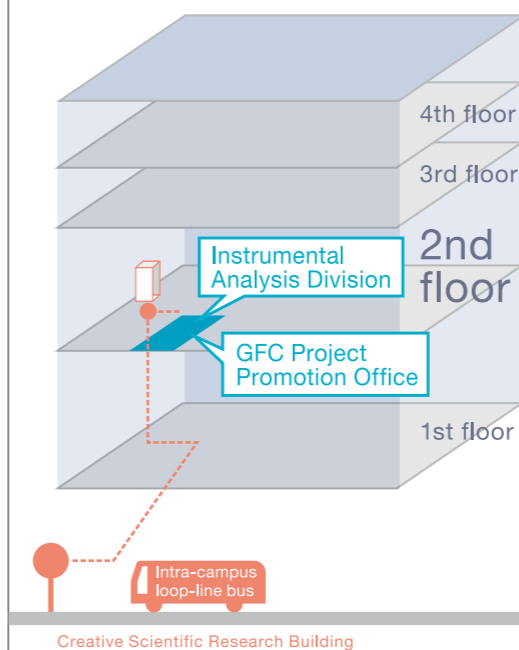
* Since the intra-campus loop-line bus is operated for business inside the university, students and tourists cannot use it.

* For the International Affairs Division and Reuse and Recycling Division, please contact the switchboard telephone number (011-706-9148)

* For the Prototype Machining Solutions Division, please visit the inquiry page inside shisaku.com



2nd Floor, Shionogi Innovation Center for Drug Discovery Bldg.



Instrumental Analysis Division /Project Promotion Office

2nd Floor, Shionogi Innovation Center for Drug Discovery Bldg. Kita 21-jo Nishi 11-chome, Kita-ku, Sapporo

General inquiries

TEL 011-706-9148

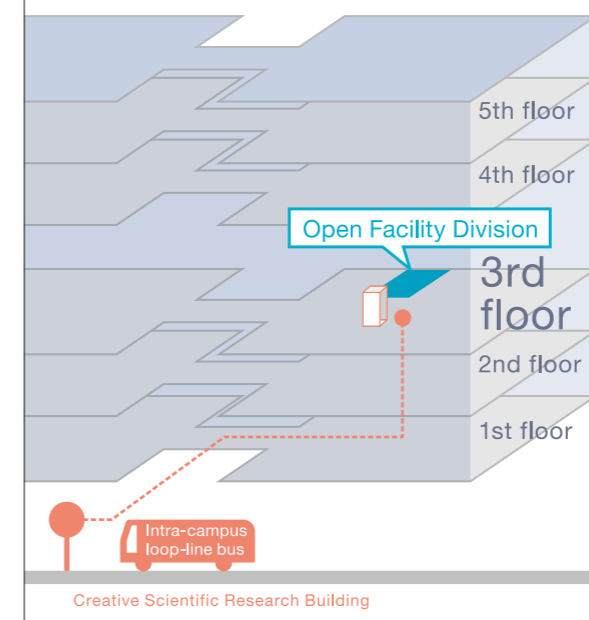
E-mail:contact@gfc.hokudai.ac.jp

Instrumental Analysis Division

TEL 011-706-9235

E-mail:adm-iad@gfc.hokudai.ac.jp

Room 308, 3rd Floor, Creative Scientific Research Bldg.



Open Facility Division

Room 308, 3rd Floor, Creative Scientific Research Bldg. Kita 21-jo

Nishi 10-chome, Kita-ku, Sapporo

TEL 011-706-9230

E-mail:shien@cris.hokudai.ac.jp