

Overview 2014-2015

Inter-University Research Institute Corporation
**Research Organization of
Information and Systems**

National Institute of Polar Research

National Institute of Informatics

The Institute of Statistical Mathematics

National Institute of Genetics

Transdisciplinary Research Integration Center

Database Center for Life Science

Academic Challenges in the Information Era

The Research Organization of Information and Systems (ROIS) is umbrella organization of the four national institutes in Japan, the National Institute of Informatics, the Institute of Statistical Mathematics, the National Institute of Genetics and the National Institute of Polar Research. The ROIS was established in 2004 as one of the Inter-University Research Institutes in Japan. The concept of ROIS is to contribute to understanding of and providing solutions to many problems we are facing in today's complex world, from the viewpoint of information and systems. Each of the four institutes in ROIS not only carries out cutting-edge research in its scientific fields closely collaborating with the research communities, but also strives to open up new research fields and methodologies. Since its establishment, ROIS has been making its best effort to promote trans-disciplinary research by enhancing collaborations among universities and institutes within as well as outside ROIS. In order to fulfill its mission as an Inter-University Research Institute, ROIS is firmly committed to contributing to other universities and institutes across Japan and abroad. As for graduate school education, which is an important mission of the Inter-University Research Institutes, ROIS functions as a core organization to support the Graduate University for Advanced Studies, by training graduate students who are expected to lead academic research in the coming new age.



What are the Inter-University Research Institutes?

Inter-University Research Institutes are unique research organizations in Japan that promote research across disciplines among all the universities in the country. They perform joint research with researchers in the universities based on cutting-edge research while offering large-scale research facilities, network systems, large-scale data-bases, and analytical materials, methods and scientific information that a single university would find it difficult to create and maintain.

Functions of the Inter-University Research Institutes

1. Cutting-edge research

Conducting their own cutting-edge research based on researchers' free thinking.

2. Joint use and joint research

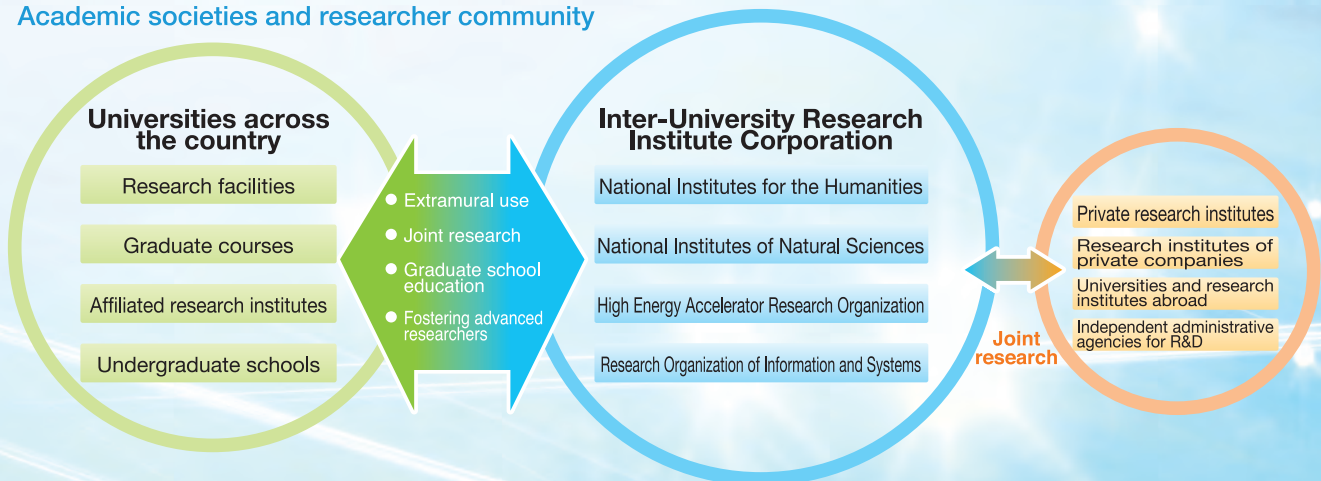
Serving as centers for various academic disciplines to provide research opportunities for researchers across the country while responding to the ideas and opinions from researcher communities.

3. Graduate education

Taking advantage of the leading-edge research environment to accept graduate students and cooperate in the development of human resources that will play active roles in the next generation as the fundamental institution behind the Graduate University for Advanced Studies.

The core research base for academic institutions in Japan

Academic societies and researcher community



Philosophy of the Research Organization of Information and Systems

The Research Organization of Information and Systems (ROIS) establishes and operates core research institutes for promoting integrated research on a global level in the areas of polar sciences, informatics, statistical mathematics, and genetics in collaboration with the research communities at universities and other organizations all over Japan. The Organization also aims to conduct integrated research across disciplines by addressing, from the perspectives of information and systems, issues involving complex phenomena of life, Earth, the natural environment,

human society, and other areas, as critical issues for the 21st century. To achieve this, a central organization has been established to facilitate integrated research, and will attempt to construct a new research paradigm and to open up new research areas, again adopting an information and systems perspective. Also, by offering an information platform that supports the speedy and effective development of research at universities and other academic research institutes in Japan and overseas, the Organization seeks to raise the level of research in Japan.



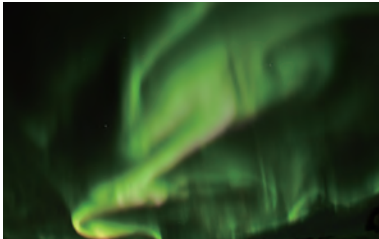
National Institute of Polar Research



Antarctic Syowa Station



Arctic Ny-Ålesund Research Station



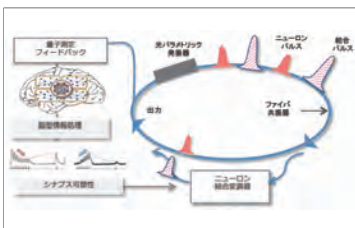
Aurora observation from Syowa Station



Program of the Antarctic Syowa MST/IS Radar (PANSY)

Based on field observations in the Antarctic and the Arctic and using the results of modeling and data and sample processing, the NIPR has been promoting joint research with a view to developing an advanced earth system science that includes earth science, environmental science, solar-terrestrial system science, space and planetary science, biological science, etc. The NIPR also plays the role as the core institute for the execution of Antarctic monitoring programs and the Green Network of Excellence (GRENE) Arctic Climate Change Research Project by managing observational facilities in the Antarctic and the Arctic.

NII National Institute of Informatics



We use a quantum measurement feedback circuit to interconnect 1 million optical pulses simultaneously generated in a fiber parametric oscillator, thereby solving a big graph problem.



Grand Challenge, "the Todal Robot Project"



Contribution to society with a Cyber Physical System (CPS)



Opening up the future of the academic community by promoting a variety of projects

As Japan's only comprehensive academic research institute in the field of informatics, the National Institute of Informatics (NII) promotes basic research in informatics from a long-term perspective together with practical research designed to solve issues that confront society. In cooperation with universities and research organizations, the NII is also involved in the design, construction, and operation of a high-speed network, called the Science Information NETWORK (SINET), academic information circulation systems, and cloud computing-based common information sharing systems in order to support leading-edge research activities as well as general educational and research activities.



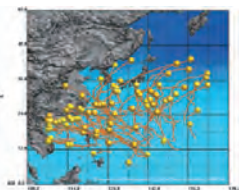
The Institute of Statistical Mathematics



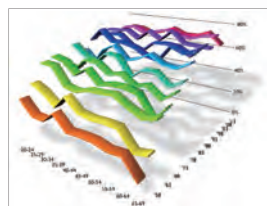
New supercomputing systems ("A", "I", "C")



Project of Fostering and Promoting for Statistical Thinking: Provides a variety of programs, and is contributing to the development of professionals with deep specialization.



Tracks of the artificial TCs in September calculated by the ISM-stochastic TC (Tropical Cyclones) model.

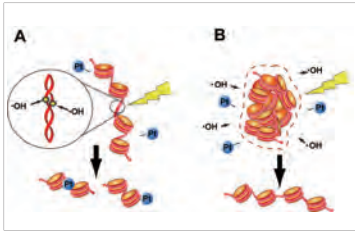


3D graph of female responses to "I'd like to be reborn as a woman," using Surveys on the Japanese National Character (1958-2013)

Statistical mathematics, sometimes referred to as the "grammar of science," is an essential scientific method for revealing truths in the world based on data. Modeling and forecasts based on big data are attracting attention as techniques to analyze incomplete information and the uncertainty of phenomena of the real world, and to solve the complex and pressing problems of our society. As the only institution in Japan dedicated to education and research of statistical mathematics, The Institute of Statistical Mathematics carries out research and development on advanced techniques in statistical mathematics, and develops professionals who are capable of rational decision-making based on data.



National Institute of Genetics



A. Decondensed chromatin B. Condensed chromatin



Conservation and distribution of wild rice accessions



Supercomputing system



DNA sequencer

Life is a complex system generated by the mutual interaction between genetic information engraved in the genomes and the internal and external environment. At the National Institute of Genetics (NIG), cutting-edge research is conducted in areas such as cell function, development and differentiation, evolution and diversity, and genome information, aiming to clarify the system of life. In addition, the NIG advances the basis for life science, DNA Data Bank of Japan (DDBJ), as well as the Bioresources Project and Advanced Genomics Project, promoting joint use and research. Furthermore, by establishing the Center for Frontier Research, NIG strives to develop new fields in life sciences and to bring up young researchers.

Transdisciplinary Research Integration Center

The Transdisciplinary Research Integration Center (TRIC) consolidates the intelligence infrastructure of information technology developed at the National Institute of Informatics as well as the modeling and computational skills developed at the Institute of Statistical Mathematics with the data and knowledge of vast amounts of earth and life sciences obtained at the National Institute of Polar Research and the National Institute of Genetics. The TRIC currently promotes four transdisciplinary research projects for the creation of



new paradigms in the field of earth, life, and human and social systems, generating original methods of discovering truth and predicting future phenomena based on data and modeling.

Database Center for Life Science

The Database Center for Life Science (DBCLS) was established in April of 2007 as a core organization of database integration project in Japan, and has provided various services such as a portal site, cross search of life science databases. Currently, we are focusing on building international standards and developing new integration system by means of technologies based on Resource Description Framework (RDF), which can connect diverse and independent databases in various sectors of life science. The system is essential to



achieve our ultimate goal, the world's preeminent integrated database, not by large-scale centralized integration but by federated or cooperative integration.

Data Centric Science Research Commons



With the rapid progress of information and communication technology, the effective use of big data has become crucial for the development of science and technology, the establishment of data-centric science, regarded as the fourth paradigm science following empirical science, theoretical science and computational science, is essential. The Data Centric Science Research Commons was established to build an infrastructure for research on the utilization of big data and core base for the transdisciplinary research in the related areas.

Number of Institutions and Joint Researchers Enrolled in Inter-University Joint Research Projects, FY2013

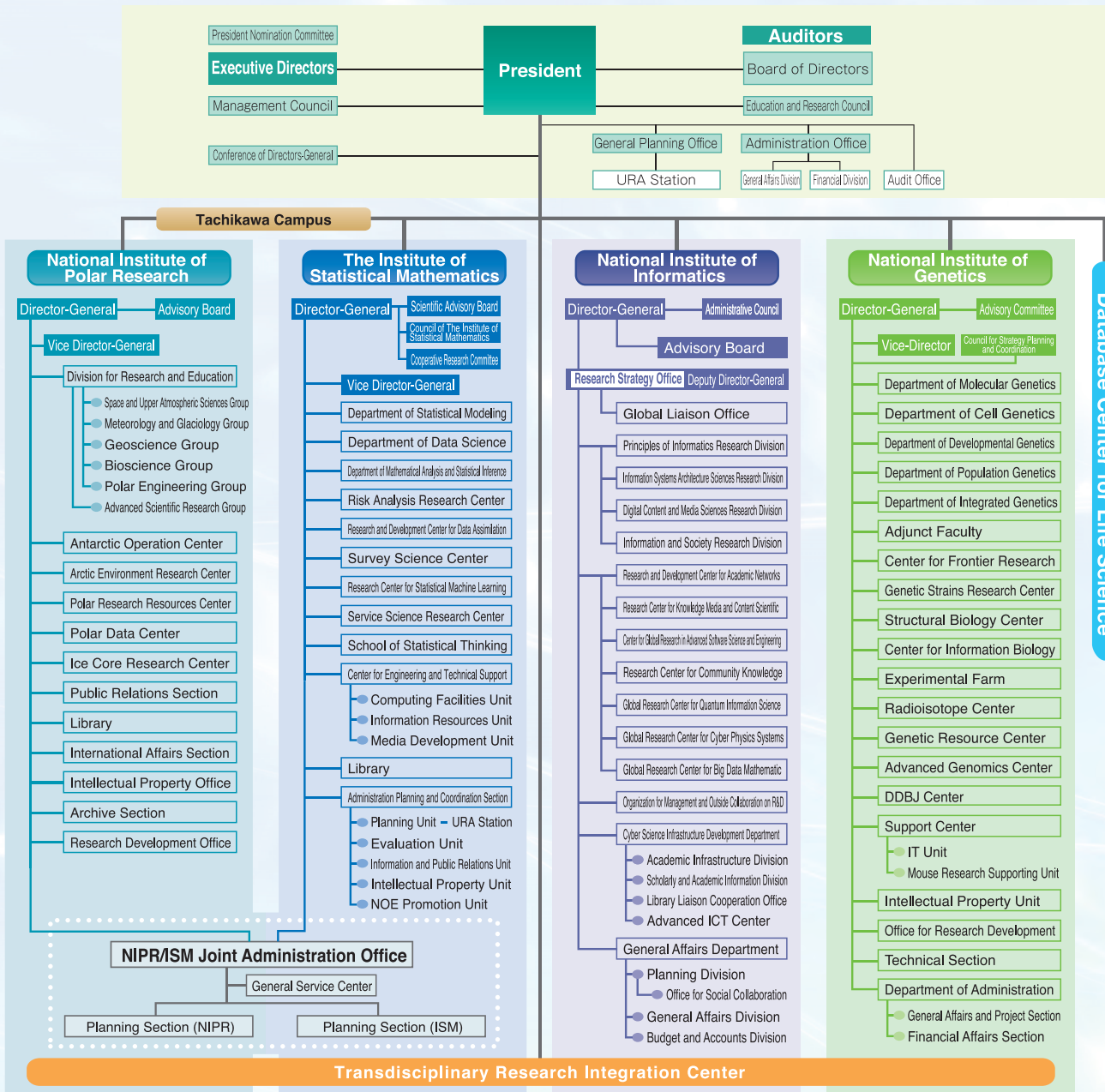
[Units: Cases, people]

	Number of institutions	Total	Breakdown of organizations to which joint researchers belong							
			National Universities	Inter-University Research Institutes	Public Universities	Private Universities	Public Institutions	Private Institutions	Foreign Organizations	Others
National Institute of Polar Research	200	1,160	704	20	34	132	182	39	39	10
National Institute of Informatics	150	433	231	20	17	71	10	26	58	0
The Institute of Statistical Mathematics	280	887	407	19	52	243	111	30	21	4
National Institute of Genetics	123	488	253	13	21	112	33	7	49	0
Total	753	2,968	1,595	72	124	558	336	102	167	14

Education in the Graduate University for Advanced Studies, FY2013

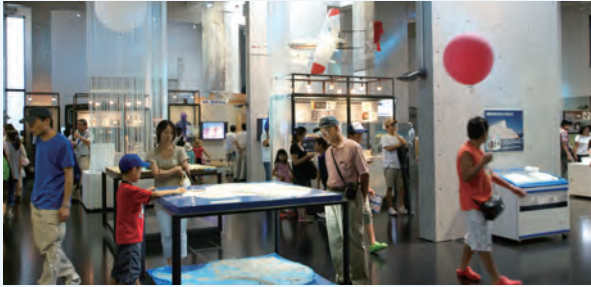
Schools	Departments	Location	Number of students enrolled (Foreign students)	Number of degrees conferred
School of Multidisciplinary Science	Statistical Science	The Institute of Statistical Mathematics	29 (2)	6
	Polar Science	National Institute of Polar Research	16 (0)	2
	Informatics	National Institute of Informatics	75 (43)	9
School of Life Science	Genetics	National Institute of Genetics	35 (11)	4
Total			155 (56)	21

Organization Chart (As of May 1, 2014)



Polar Science Museum (under the National Institute of Polar Research)

The Polar Science Museum is a newly established permanent exhibition within the Tachikawa campus to spread information relating to the current status, achievements and history of the forefront of Japan's polar science research, Antarctic and Arctic observations. Antarctic and Arctic auroras can be viewed as a movie on the whole sky dome screen in the Aurora Theater, and footage of Antarctica, meteorites and stuffed biological specimen, actual snowmobiles used by the research expedition, room models of the Syowa Station and Antarctic ice that can be touched are some of the items on display.



The National Institute of Genetics Exhibition Room

The history and photographs spanning 60 years of the National Institute of Genetics are on display in a room on the first floor of the main building. Historical documents representing developments in genetics research and life sciences are displayed, such as commemorative papers from when second generation director Hitoshi Kihara hosted a tasting of the seedless watermelons he developed at the Prime Minister's Office in 1947, and decoding completion reports from when precise decoding of the human genome was completed in 2003. Additionally, other valuable items in the collection include a first edition volume of Darwin's "Origin of Species" and paper reprints and portraits of Mendel. The collection of painted dishes, painted by prominent researchers such as Watson, famous for proposing the double helix structure of DNA, in commemoration of their visit to the late Professor Yukinori Hirota, amounts to over 100 pieces.



Women researchers directory: "Habatake~Women Researchers of Japan"

We use this institute's research results to publish a women researchers directory. Information registered in Researchmap is automatically collected and transmitted making it easy to find women researchers throughout Japan.

Women Researchers of Japan <http://women.rois.ac.jp/>

National Institute for Polar Research Public Lecture

Public lectures with leading NIPR researchers outlining the forefront of Antarctic and Arctic observation have been implemented since 2011. To incorporate the needs of the local people, the course is implemented in collaboration with the Tachikawa and Tachikawa public interaction university committees.

The Institute of Statistical Mathematics Tutorial Courses

Tutorial Courses on statistical science are held around 13 times a year for the benefit of researchers, students and the general public. The level of courses varies from beginner to advanced.

NII Public Lectures

NII researchers provide explanations on the forefront of informatics to the public. This fiscal year, the series will be held 8 times under the theme "Informatics that Create the Future." After completion, video footages and other materials will be publicized on the homepage and iTunesU.

National Institute of Genetics Public Lecture

Public Lecture by instructors from the National Institute of Genetics take place once a year around the Tokyo area.

Publication

The study results are published as a series of books, introduced and described in an easy-to-understand way. "NII Series," "Polar Research Library," "ISM Series" and "Break through the Boundaries of Knowledge!" have been published.



1 Research Organization of Information and Systems

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2 National Institute of Polar Research

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TEL:(0)42-512-0608 <http://www.nipr.ac.jp/english/>

3 National Institute of Informatics

2-1-2 Hitotsubashi, Chiyoda-ku, Tokyo 101-8430, Japan
TEL:(0)3-4212-2000 <http://www.nii.ac.jp/en/>

4 The Institute of Statistical Mathematics

10-3, Midori-cho, Tachikawa, Tokyo 190-8562, Japan
TEL:(0)50-5533-8500 http://www.ism.ac.jp/index_e.html

5 National Institute of Genetics

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TEL:(0)55-981-6707 <http://www.nig.ac.jp/english/index.html>

6 Transdisciplinary Research Integration Center

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7 Database Center for Life Science

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TEL:(0)4-7135-5508 <http://dbcls.rois.ac.jp/en/>

The Arctic



The Antarctic