

Overview 2015-2016

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) was established to bring together the National Institute of Informatics, the Institute of Statistical Mathematics, the National Institute of Genetics and the National Institute of Polar Research, upon the incorporation of the Inter-University Research Institutes, for the purpose of understanding and predicting our complex world from the perspective of information and systems. The institutes of ROIS promote cutting-edge research from their unique standpoints, attempting to construct research paradigms and to open up new research areas in fulfillment of the Organization's mission. ROIS will further strive to strengthen its joint use and joint research functions as an Inter-University Research Institute. For graduate school education, the third mission of the Inter-University Research Institutes, ROIS functions as the core organization behind SOKENDAI (The Graduate University for Advanced Studies), training human resources to lead academic research in a new age.



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

What are 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 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

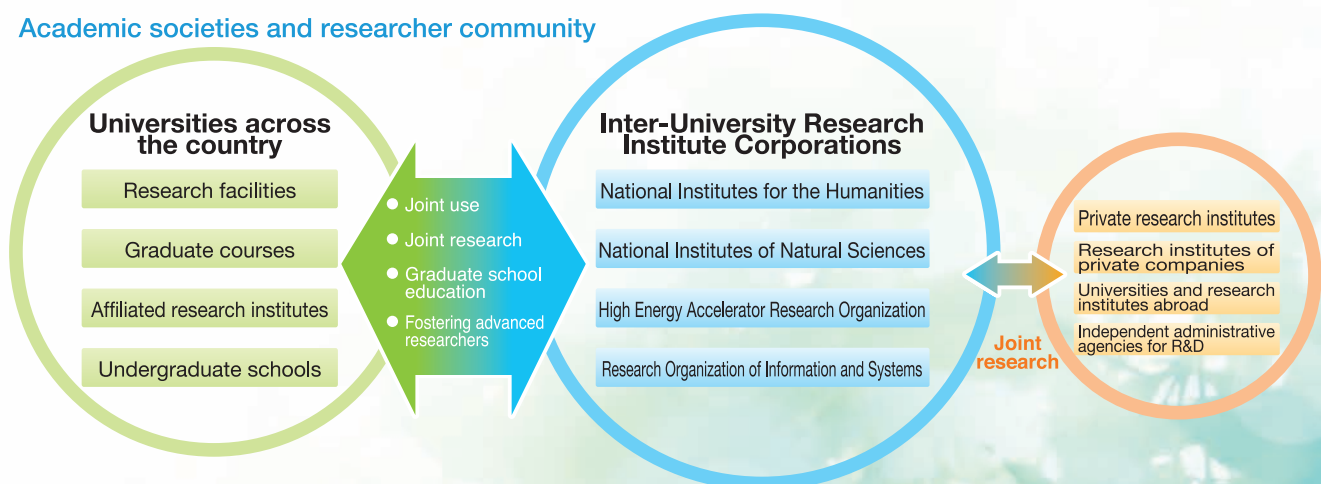
Serving as centers for various academic disciplines, to provide research opportunities for researchers all over Japan while responding to the ideas and opinions from researcher communities.

3. Graduate education

Taking advantage of the leading-edge research environment, to accept graduate students and to cooperate in the development of human resources that can play active roles in the next generation, as the basic educational institution of 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 can 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



Syowa Station in Antarctic



Ny-Ålesund Research Station in Arctic



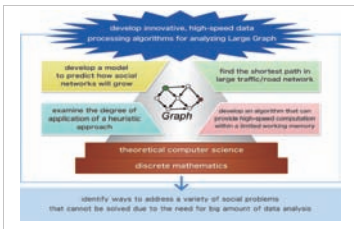
Aurora observation from Syowa Station



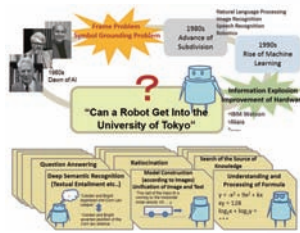
Program of the Antarctic Syowa MST/IS Radar (PANSY)

The polar regions around the South Pole and North Pole each comprise a huge natural system. Based on field observations, we promote using the analysis of data modeling and sample processing. The NIPR has been promoting joint research for developing an advanced earth system with a synthetic science view. Those studies include earth science, environmental science, solar-terrestrial system science, space and planetary science, biological science, etc. The NIPR also plays the core role as an institute for Antarctic monitoring programs and the Green Network of Excellence (GRENE) Arctic Climate Change Research Project, with observational facilities in the Antarctic and the Arctic.

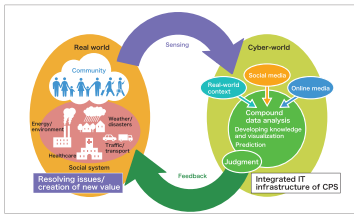
NII National Institute of Informatics



Kawarabayashi Large Graph Project: Overview Diagram



Grand Challenge, "the Todai Robot Project"



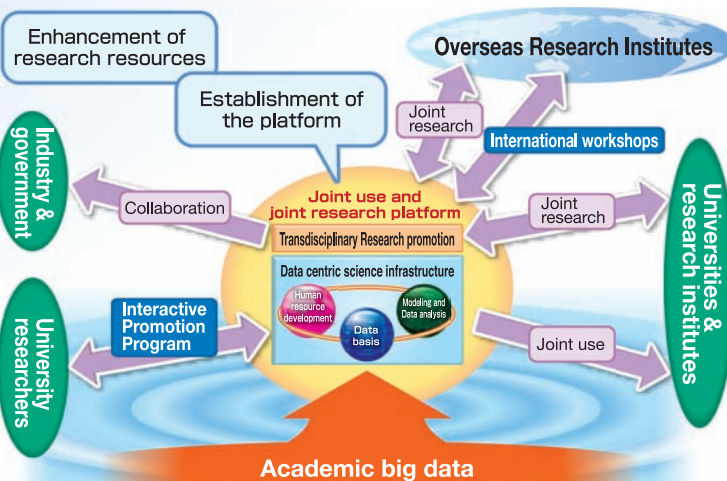
Contribution to society with a Cyber Physical System (CPS)



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.

Data Centric Science Research Commons



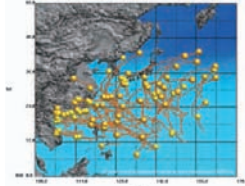
With the rapid progress of information and communication technology, the effective use of big data has become crucial for the development of science and technology, the establishment of data-centric science, regarded as the fourth paradigm science following empirical science, theoretical science and 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.



The Institute of Statistical Mathematics



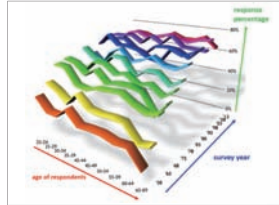
Three supercomputer systems("A", "I", "C")



Trajectories of the artificial tropical cyclones calculated by a stochastic model



The School of Statistical Thinking offers various educational programs, from extension courses to professional development.

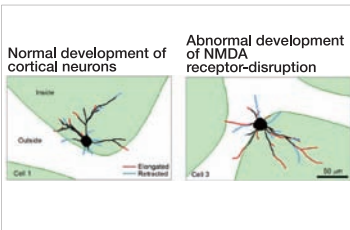


3D graph of percentage of women who want to be reborn as woman using Surveys on the Japanese National Character (1958 - 2013)

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 (ISM) carries out research and development on advanced techniques in statistical mathematics, and develops professionals who are capable of rational decision-making based on data.



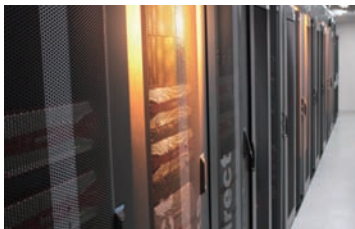
National Institute of Genetics



Morphological changes of cortical neuron dendrites during 18 hours



Conservation and distribution of wild rice accessions



Supercomputer 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 foster young researchers.

Transdisciplinary Research Integration Center

The Transdisciplinary Research Integration Center (TRIC) consolidates the information technology and IT infrastructure 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 and cross search of life science databases. Currently, we are focusing on the development of a new DB integration system and its international standardization 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 by federated or cooperative integration, instead of by large-scale centralized integration.



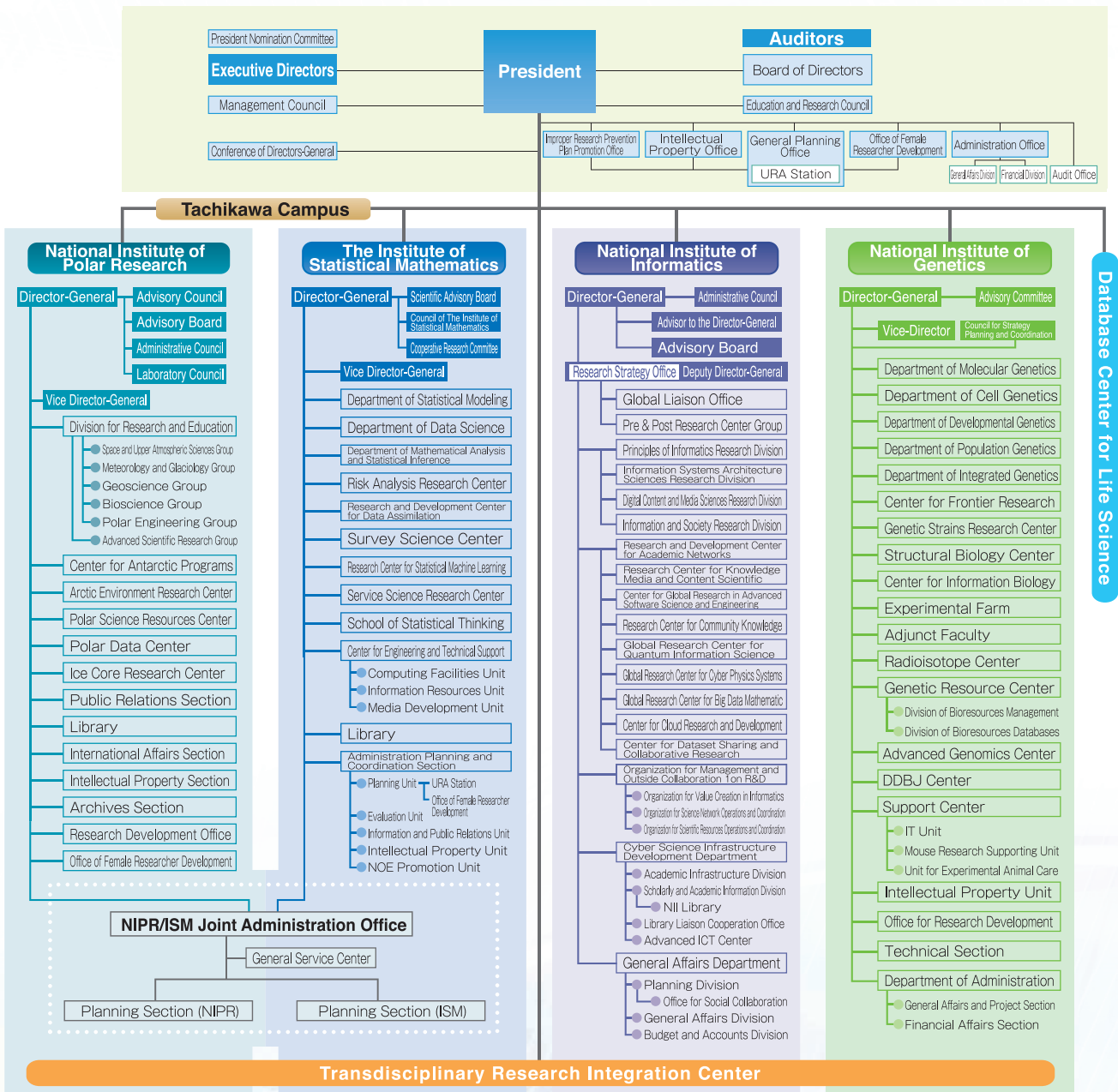
Number of Institutions and Joint Researchers Enrolled in Inter-University Joint Research Projects, FY2014

	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	197	1,145	699	10	36	126	182	43	32	17
National Institute of Informatics	105	295	179	3	15	52	8	12	25	1
The Institute of Statistical Mathematics	287	832	394	21	40	208	107	29	20	13
National Institute of Genetics	141	560	294	19	21	129	37	13	43	4
Total	730	2,832	1,566	53	112	515	334	97	120	35

Education in SOKENDAI (The Graduate University for Advanced Studies), FY2014

Schools	Departments	Parent institutes	Number of students enrolled (Foreign students)	Number of degrees conferred	Total no. of degrees conferred (2004-2014)
School of Multidisciplinary Sciences	Statistical Science	The Institute of Statistical Mathematics	29 (3)	5	60
	Polar Science	National Institute of Polar Research	18 (0)	2	29
	Informatics	National Institute of Informatics	74 (42)	11	108
School of Life Sciences	Genetics	National Institute of Genetics	43 (13)	5	92
Total			164 (58)	23	289

Organization Chart (As of May 1, 2015)



Symposium

ROIS organizes an annual symposium. Its theme is selected from commonly shared research topics of our institutes. In 2014, speakers from inside and outside ROIS delivered lectures, which are followed by a poster session.

Open House

Each institute has an open house day for the public, with researchers providing lectures, exhibitions, and other types of explanations to make its everyday research activities and results known to local communities, researchers and aspiring researchers.

Polar Science Museum (NIPR)

The Polar Science Museum is a permanent exhibition facility established on the Tachikawa Campus. It offers a broad range of information on Japan's foremost polar science studies as well as its current status, results of Antarctic and Arctic observation, and introducing of its history.



Exhibition Space in the National Institute of Genetics

This room exhibits various materials representing over 60 years of NIG's history. Also in display are the first edition of "On the Origin of Species" by Charles Darwin, as well as a collection of plates drawn by Nobel laureates and other distinguished researchers upon their visit to NIG.



Website

The ROIS website is a portal for information on its activities and events, corporate data, and the latest information about its institutes. We have also the Research Commons website and the URA Station website.

Public Lectures Tutorial Courses

Each institutes has the unique lectures or courses. NIPR holds 6 public courses on polar science every year, and ISM holds multiple "Tutorial courses" on statistical mathematics. NII researchers provide explanations on the forefront of informatics to the public in a lecture series named "Informatics Forefront". NIG holds the "Genetics Public Lecture" annually in Tokyo.

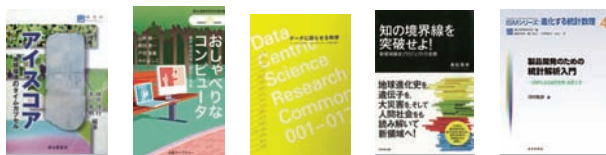
Women researchers directory: Habatake -Women Researchers of Japan-

As part of the activities of the Committee for Promotion of Equality, we have been developing a women researchers' directory and supporting to build nationwide researchers' networks. Information on women researchers registered in the Researchmap developed by this institute. ROIS. is collected automatically for the directory. It contributes to access women researchers' activity throughout Japan.

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

Publications

ROIS publishes serial publications that plainly explain its research findings to the general public in the form of available books. "Polar Research Library", "NII Series", and "ISM Series" have been published. Last year, we also published a booklet about the Research Commons Project.



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