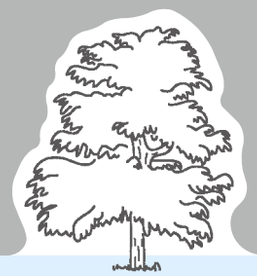
RESEARCH CENTER FOR ADVANCED SCIENCE AND TECHNOLOGY

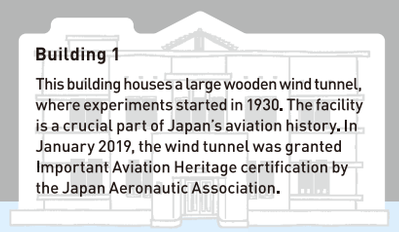
2020–2021

東京大学 先端科学技術研究センター

Research Center for Advanced Science and Technology

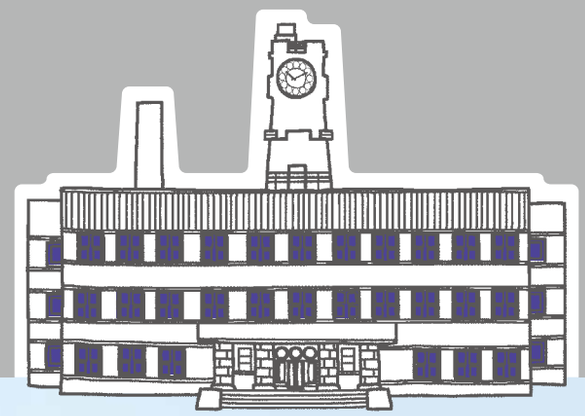
The University of Tokyo





Building 1

This building houses a large wooden wind tunnel, where experiments started in 1930. The facility is a crucial part of Japan's aviation history. In January 2019, the wind tunnel was granted Important Aviation Heritage certification by the Japan Aeronautic Association.



The Research Center for Advanced Science and Technology shall aim
to contribute to the development of science and technology by expeditiously taking
on new challenges arising from the advancement of science and changes
in society thereby exploring new areas of advanced science
and technology for humankind and society.

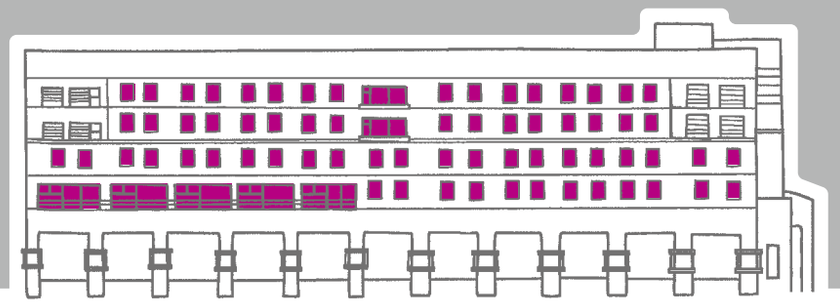
Article 2,
Rules for the Research Center for Advanced Science and Technology,
the University of Tokyo

Director
Research Center for Advanced Science and Technology
the University of Tokyo

Ryoki Kanzaki

"Interdisciplinary fusion" for coexistence with nature and the happiness of all, not some, people

Society is becoming increasingly complicated as it undergoes dynamic changes. This modern society sees problems emerging one after another that cannot be solved by simply finding optimum solutions or scientific theoretical methods. Science simply cuts out a part of the natural phenomena that it is capable of explaining, but it does not explain the whole. In a complex society populated by diverse individuals, while it is important to arrive at optimum solutions to problems, now is an era that requires more flexible and diversified solutions.
Human beings cultivate their sensitivity in a variety of natural environments and through communication among the people. This sensitivity comes to gain greater diversity and individuality in the natural environment that nurtured it and through the individual's experience. However, we now live in an era flooded with information from an impersonal world made up of the Internet, video games, and smartphones. We have little experience communing with nature, and human relationships are now born without direct human communication. Under these situations, rapid development of information technology and globalization have taken place, and this is the environment where we have inhumane and homogenous problem solving, manufacturing, and even human resources development.
I believe that what is important today is to revert to the natural environment and the sensitivity it nurtured, rethink science and technology from humankind's inherent viewpoints through this sensitivity, and present to the world Japan's original science and technology that aim at the creation of a sustainable inclusive society.
Research Center for Advanced Science and Technology (RCAST) was founded in 1987 to "explore new areas of advanced science and technology for the benefit of humankind and society." Abiding by this spirit, RCAST today integrates not only the sciences, including engineering, information science, and medicine; the humanities, such as social sciences; and the field of barrier-free research, but also the advanced field of design. This shows that based on its diversified perspectives through interdisciplinary fusion and the lofty spirit and morality of humankind, RCAST persists in taking on new challenges to find solutions that "leave no one behind."



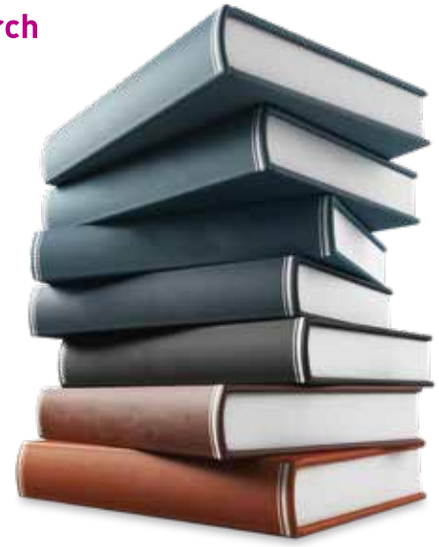
Building 3 South

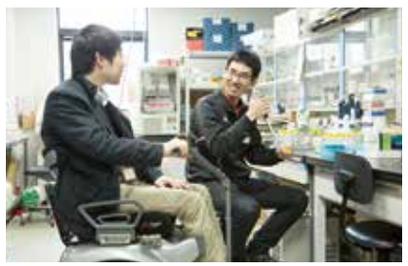
The newest building at RCAST was designed with an eye to continuity with other buildings on the campus.
In addition to the Academic-Industrial Joint Laboratory for Renewable Energy, it houses environment and energy labs. The ENEOS hall on the first floor seats 170.

INTERDISCIPLINARY, INCLUSIVE APPROACH

Thirty Years of Interdisciplinary Research and a 15-year Focus on Inclusivity

Resolutions to increasingly complex social issues require fresh perspectives. Having the foresight to pursue fields where there is no existing research is part of RCAST's DNA. Since the center was founded over 30 years ago, science and engineering have co-existed with humanities and social sciences, which deal with ethics, thought, and social systems.
In barrier-free studies established more than 15 years ago, research into barrier-free solutions leverages technology to overcome human and social barriers.





Field-specific Laboratories

A field-specific laboratory structure enhances researchers' originality and generates synergy. This structure aims to encourage interdisciplinary collaboration through unanticipated interactions among researchers from different disciplines, while enhancing the creativity of individual researchers.
Repeated interactions with researchers from different fields contribute to fruitful discussions in interdisciplinary projects. This synergy is generated by RCAST's hallmark interdisciplinary research.

UNIQUE LINE-UP

World-renowned Researchers, Artists—and a Bear

At RCAST, we are proud to be joined by top researchers from around the world. We also have researchers with disabilities, artists and athletes. Coming into contact with such a diverse range of viewpoints prompts us to question things taken for granted in our own narrow world. In June 2018, Kumamon, the popular bear mascot of Kumamoto Prefecture joined RCAST's research team. Who will be next?

INTERACTION

The sole UTokyo-affiliated institution offering graduate-level education to outside professionals

Corporate researchers and specialist personnel increasingly require doctoral degrees. Universities not only enable in-depth study of a chosen field, but also develop a systematic understanding and broad overview of science and technology. A cutting-edge environment that brings students into close contact with interdisciplinary research, researchers from diverse backgrounds, and ground-breaking joint research projects is ideal for high-level training of corporate researchers who are tackling increasingly complex social issues.

EDUCATION

HAPPY HOUR

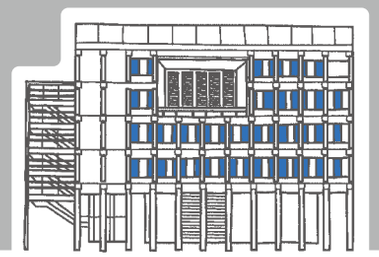
A mingling of minds

Laboratories hosting Happy Hours come up with entertaining drawcards every month, such as games or soup-tasting. Participants make face-to-face connections with people they may know only through e-mails or casual greetings. Such ease of communication spanning research fields and job roles is another point of pride at RCAST.

Researchers are good communicators

RCAST researchers enthusiastically convey the fun and challenge of their research via Research Tours for junior and senior high school students that feature lab visits and lectures. Researchers also enjoy communicating their latest efforts in unique events at the Komaba Research Campus Open House, which targets a broad public audience.

OUTREACH ACTIVITIES



Building 14

This building has rich historical value on a par with that of Building 13. At lunchtime, food trucks gather between those two buildings to set up their stalls. Café seminars and a monthly Happy Hour are held in the RCAST Café on the 1st floor.

When laboratories with unique strengths pool their creativity, projects are super-charged

Each unique laboratory pursues its own large-scale projects and engages in interdisciplinary projects where multiple laboratories collaborate to try out new approaches.

INCLUSIVITY

Inclusive Academia Project

RCAST has various science and engineering laboratories, as well as many STEM students and researchers with disabilities from around the world who focus on advanced research. The aim of this project is to create a research center where they can pursue career paths in collaboration with various research institutes worldwide, fostering an environment of “academia for all and academia by all.”

SUSTAINABLE COMMUNITIES

Co-creation Living Lab

Knowledge of cutting-edge science and technology combined with regional collaboration networks built up over many years enable us to conceive strategies and tools pinpointing regional issues and design the sustainable regional communities of the future.

UTOKYO-RAILS

UTokyo-Research Alliance for Information and Life Sciences

This Alliance fuses computational and quantitative life science, data science, and AI to provide opportunities for promising young researchers to take on the challenge of large-scale projects in life sciences, such as cancer progression and disease control. In February 2020, an efficient and effective core facility equipped with automated technologies was opened to provide young researchers with more thinking time and accelerate their activities.

IDEA Project

The IDEA project has developed an ultra-short working hours scheme for people with disabilities, starting from as little as 15 minutes of work per week.
In 2017, SoftBank Corporation was awarded a Good Design Special Award for the Short Working Hours Program supported by the IDEA project.

ULTRA-SHORT WORKING HOURS

GREATER DIVERSITY

DO-IT Japan

This project supports students with disabilities to learn about technology and consider self-advocacy, disability issues, and self-determination, encouraging students to become leaders in society and empower others. It also provides transition support for study and employment.

OUR COMMITMENTS
Commitment to SDGs Defines RCAST

No other research institute fuses humanities and science in more than 40 fields of research within a small organization of around 700 people, including students. Harnessing this unique and diverse academic environment, RCAST believes in the possibility of achieving all the SDGs.
To address climate change, a key theme of the SDGs, RCAST has joined an international project to clarify climate change mechanisms and research renewable energy.

SUSTAINABLE DEVELOPMENT

SUSTAINABLE DEVELOPMENT GOALS

Labs named for a wide variety of specialized fields are engaged in dynamic research activities

Materials
- Micro Device Engineering
- Quantum Information Physics and Engineering
- Theoretical Chemistry
- High Performance Materials

Environment and Energy
- New Energy
- Climate Science Research
- Co-creative Community Planning, Design and Management
- Energy System
- Global Climate Dynamics
- Academic-Industrial Joint Laboratory for Renewable Energy

Information
- Artificial Intelligence
- Information Devices
- Intelligent Cooperative Systems
- Mathematical Physics of Emergence Systems
- Photon based Advanced Manufacturing Science
- Information Somatics
- Communication Science
- Biological Data Science
- Networked Biophotonics and Microfluidics
- Machine Intelligence

Chemical Biomedicine
- Bioorganic Chemistry
- Genome Science
- Metabolic Medicine
- Synthetic Biology
- Integrative Nutriomics and Oncology
- Structural Biology

Barrier Free
- Barrier-Free
- Assistive Technology
- Tojisha-Kenkyu
- Inclusive Design Laboratory

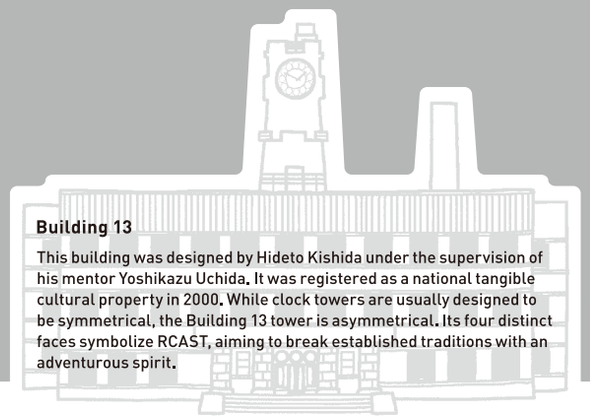
Social Science
- Intellectual Property Law
- Political Administrative System
- Religion and Global Security
- Policy Research on Science and Technology

Cooperative Laboratories
- MOT (Management of Technology)
- Energy and Environment
- Chemical Biotechnology
- Information Devices
- High Performance Materials

Social Cooperation Research Departments
- Renewable Fuels Global Network
- Department of Inflammology
- Revitalization of Suburbs
- Insect Controlled Space Design
- Mobility Zero

Corporate Sponsored Research Programs
- Clinical Epigenetics
- Progressive Logistic Science

[As of October 1, 2020]

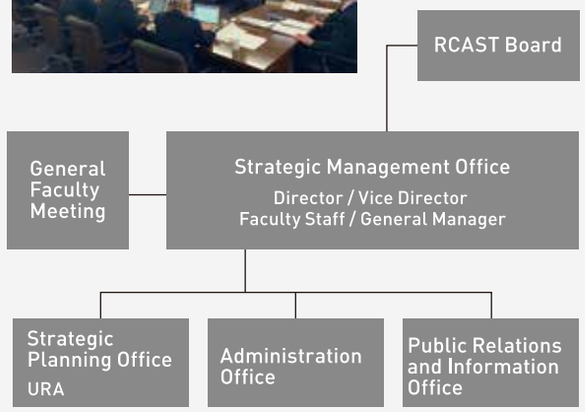


Building 13

This building was designed by Hideto Kishida under the supervision of his mentor Yoshikazu Uchida. It was registered as a national tangible cultural property in 2000. While clock towers are usually designed to be symmetrical, the Building 13 tower is asymmetrical. Its four distinct faces symbolize RCAST, aiming to break established traditions with an adventurous spirit.

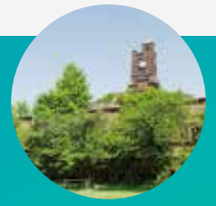
A unique system of operation that enables prompt decisions to address new challenges

A top-down decision-making system that facilitates prompt action enables RCAST to create new, world-leading research domains. Since its inception, RCAST has maintained a unique system of operations so that researchers can devote themselves to their research activities. As a core unit with primary responsibility for various aspects of operations, the Strategic Management Office deals with matters related to internal organizational streamlining, staffing proposals, and budget allocation and execution. The system reduces the amount of time researchers spend on operational issues and ensures time for their research activities.



Support services field fast-emerging and tricky issues

According to RCAST Director Ryohei KANZAKI, “Our researchers and our administrative staff are the twin engines driving RCAST’s continued success.” An operating structure reliant on prompt action needs speedy and flexible support.



Rigorous evaluation of RCAST’s management strategies “RCAST Board” external evaluation committee

RCAST Board

Chieko ASAKAWA
IBM Fellow

Noriko OSUMI
Vice President, Tohoku University

Takashi ONISHI
Emeritus Professor,
The University of Tokyo

Hideaki KOIZUMI
Honorary Fellow, Hitachi, Ltd.
Advisor/Distinguished Fellow,
The Engineering Academy of Japan

Yoshimitsu KOBAYASHI
Director of the Board, Chairperson,
Mitsubishi Chemical
Holdings Corporation

Tsuneo KOMATSUZAKI
Former Advisor of SECOM CO., LTD.

Yoichi NISHIMURA
Managing Director,
The Asahi Shimbun Company

Akira HIRUMA
President and CEO,
Hamamatsu Photonics K.K.

Hiroya MASUDA
Representative Executive Officer,
President & CEO,
Japan Post Holdings Co., Ltd.

Toshiro MUTOH
Honorary Chairman,
Daiwa Institute of Research Ltd.

[As of October 1, 2020 : Japanese syllabary order]

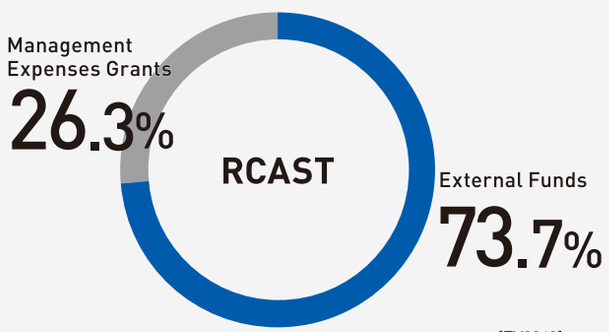
RCAST at a glance

Our high external funding ratio is evidence of our research competency expectations and results

Over 70 percent of RCAST's operating expenses are covered by external funding. This reflects recognition of RCAST’s far-sighted research and the results that it has produced, and a line-up of researchers capable of securing their own funding.

External Funding Ratio

Proportion of Management Expenses Grants to External Funds



[FY2019]

UTokyo

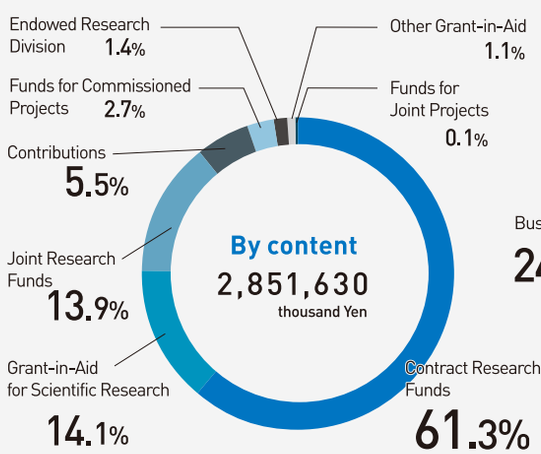
Management Expenses Grants 48.3% | External Funds 51.7%

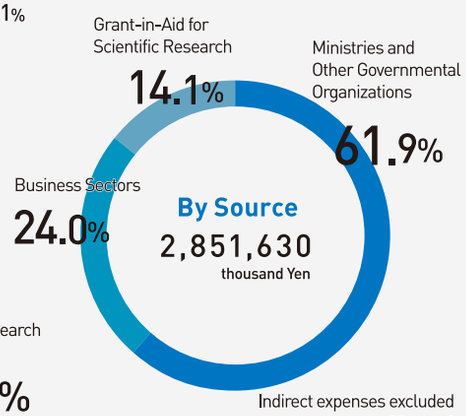
Source：The University of Tokyo Data Book 2020

Financial Statement for FY 2019

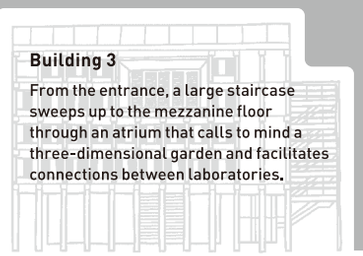
Management Expenses Grants	1,229,209 thousand Yen
External Funds	3,446,411 thousand Yen
Grand Total	4,675,620 thousand Yen

External funds





Indirect expenses excluded
[FY2019]



Building 3

From the entrance, a large staircase sweeps up to the mezzanine floor through an atrium that calls to mind a three-dimensional garden and facilitates connections between laboratories.

Global and domestic organic connections create new forms of network

Globally, RCAST researchers cooperate with world-class partners, sometimes working beyond their disciplines. They seek to advance their research via wide-ranging networks encompassing not only people-to-people exchanges, but also global academic exchange agreements.
Domestic initiatives are exemplified by a partnership agreement with Ishikawa Prefecture that has led to a very advanced example of joint industry creation.
In collaboration with local governments and communities participating in the Co-creation Living Lab, RCAST pursues forms of co-creation that go beyond conventional industry-academia-government cooperation.

International collaboration

1. Stockholm University (Sweden)
2. Clare Hall, University of Cambridge (UK)
3. University of Glasgow (UK)
4. Arizona State University, LightWorks® (USA)
5. Centre National de la Recherche Scientifique (CNRS) (France)
6. The University of New South Wales (Australia)
7. Advanced Institutes of Convergence Technology (AICT), Seoul National University (South Korea)
8. University of Kassel (Germany)
9. The University of Adelaide (Australia)
10. Queensland University of Technology (Australia)
11. The Moshe Dayan Center for Middle Eastern and African Studies (MDC), Tel Aviv University (Israel)
12. Council of Scientific & Industrial Research (CSIR) (India)
13. The Hebrew University of Jerusalem (Israel)
14. Centre for Research in Photonics, The University of Ottawa (Canada)
15. University of California, Berkeley (USA)
16. Center on Disability Studies, University of Hawaii at Mānoa (USA)

*Chronological order of agreements conclusion

[As of October 1, 2020]

RCAST Fellow

- Ping CHANG (Texas A&M University)
- Jacob M. TAYLOR (University of Maryland)
- Stefania BANDINI (University of Milan-Bicocca)
- David COPE (University of Cambridge)
- Shang-Ping XIE (Scripps Institution of Oceanography, University of California)
- Joerg WUNDERLICH (Hitachi Cambridge Laboratory)
- Tsutomu MIYASAKA (Toin University of Yokohama)
- Toshio FUJITA (UTokyo Emeritus Professor)
- Teruo KISHI (UTokyo Emeritus Professor)
- Hideaki KOIZUMI (Honorary Fellow, Hitachi Ltd. / Advisor and Distinguished Fellow, The Engineering Academy of Japan)
- Setsu ITO (Studio Ito Design)
- Yuang-Tseh Lee, (Academia Sinica)
- Takashi Mikuriya (UTokyo Emeritus Professor)
- Chieko Asakawa (IBM Fellow)

RCAST Adviser

- Yasunori BABA
- Kiyoshi NISHIOKA
- Mariko FUJII
- Hikaru KOBAYASHI
- Toru IFUKUBE

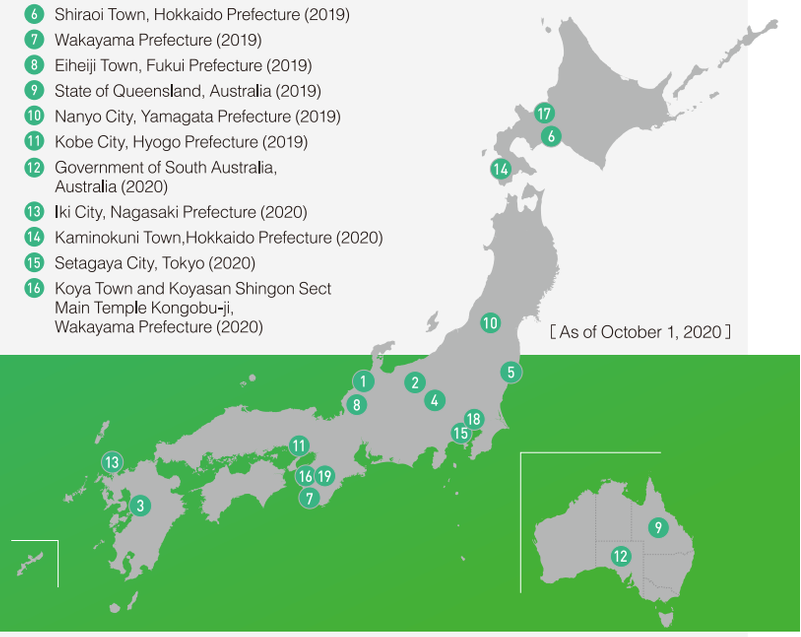
[As of October 1, 2020]

Agreement with local governments

1. Ishikawa Prefecture and Ishikawa Sunrise Industries Creation Organization (2012)
2. Obuse Town, Nagano Prefecture (2016)
3. Kumamoto Prefecture and Kumamoto University (2017)
4. Karuizawa Town, Nagano Prefecture and Shinshu University Research Center for Social Systems (2017)
5. Iwaki City, Fukushima Prefecture (2018)
6. Shiraoi Town, Hokkaido Prefecture (2019)
7. Wakayama Prefecture (2019)
8. Eiheiji Town, Fukui Prefecture (2019)
9. State of Queensland, Australia (2019)
10. Nanyo City, Yamagata Prefecture (2019)
11. Kobe City, Hyogo Prefecture (2019)
12. Government of South Australia, Australia (2020)
13. Iki City, Nagasaki Prefecture (2020)
14. Kaminokuni Town,Hokkaido Prefecture (2020)
15. Setagaya City, Tokyo (2020)
16. Koya Town and Koyasan Shingon Sect Main Temple Kongobu-ji, Wakayama Prefecture (2020)

Cooperation with domestic educational institutions

17. Science Education Center attached to Hokkaido Education Research Institute (2019)
18. Tokyo Metropolitan Board of Education (2019)
19. Koyasan University (2020)



[As of October 1, 2020]

Clare Hall, University of Cambridge – Asia Partners –

Clare Hall has welcomed RCAST faculty members as Visiting Fellows since an agreement was signed in 2006, and each summer RCAST PhD students study and research with Cambridge scholars, promoting close academic communication.

All projects differ in uniqueness of research and education

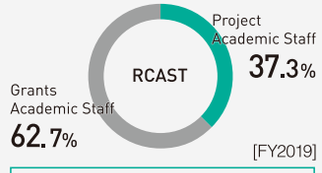
With external funding, RCAST has created the Project Researcher/Faculty System enabling unique, high-quality human resources to be employed by RCAST on a project basis. This system, originated by RCAST, can make a huge difference in research competency.

The ratio of Project Academic Staff

	RCAST	UTokyo
Professors	13.3%	7.7%
Associate Professors	48.1%	15.6%
Lecturers	61.1%	34.1%

[FY2019]

Composition ratio of Academic Staff



[FY2019]

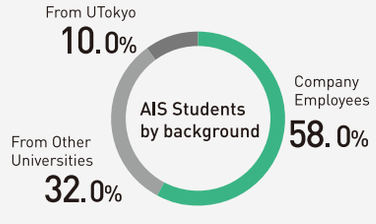
UTokyo

Grants Academic Staff 85.5% | Project Academic Staff 14.5%

Source(UTokyo)：The University of Tokyo Data Book 2020

About half our graduate school students are adults who study while working

The Department of Advanced Interdisciplinary Studies (doctoral course), has comprehensive systems to welcome those who wish to continue working during their studies.



*Attribution is as per status at time of application. In the case of foreign students, final education (excluding company employees).

[As of October 1, 2020]

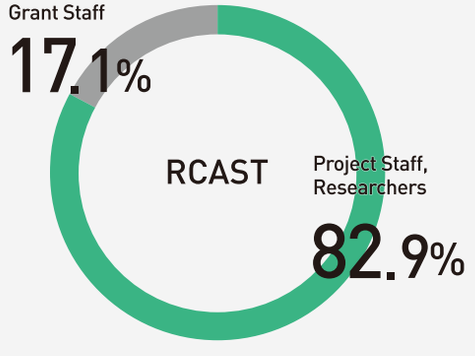
The member of Faculty and Staff

Academic Staff		**322**
Grant Staff	55	
Project Staff	51	
Researchers *	216	
Administrative Staff		**54**
Grant Administrative Staff	26	
Project Specialists	28	
Students		**369**
Graduate Students	323	AIS Students 100
Undergraduate Students	46	

*Researchers: Project Researchers, Visiting Research Fellows, Co-operative Research Fellows, UTokyo Research Fellows, Joint Research Fellows

[As of October 1, 2020]

The ratio of Research Staff



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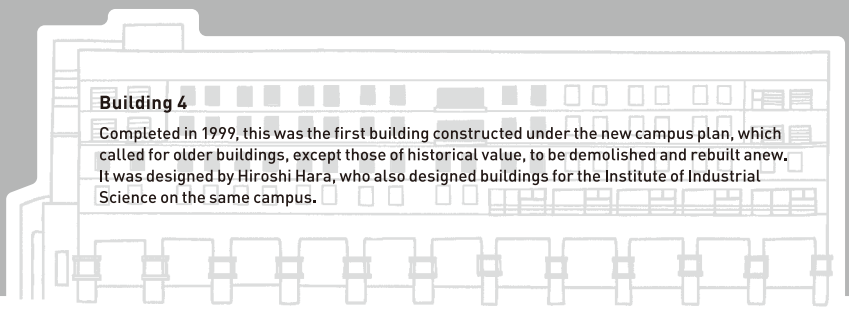
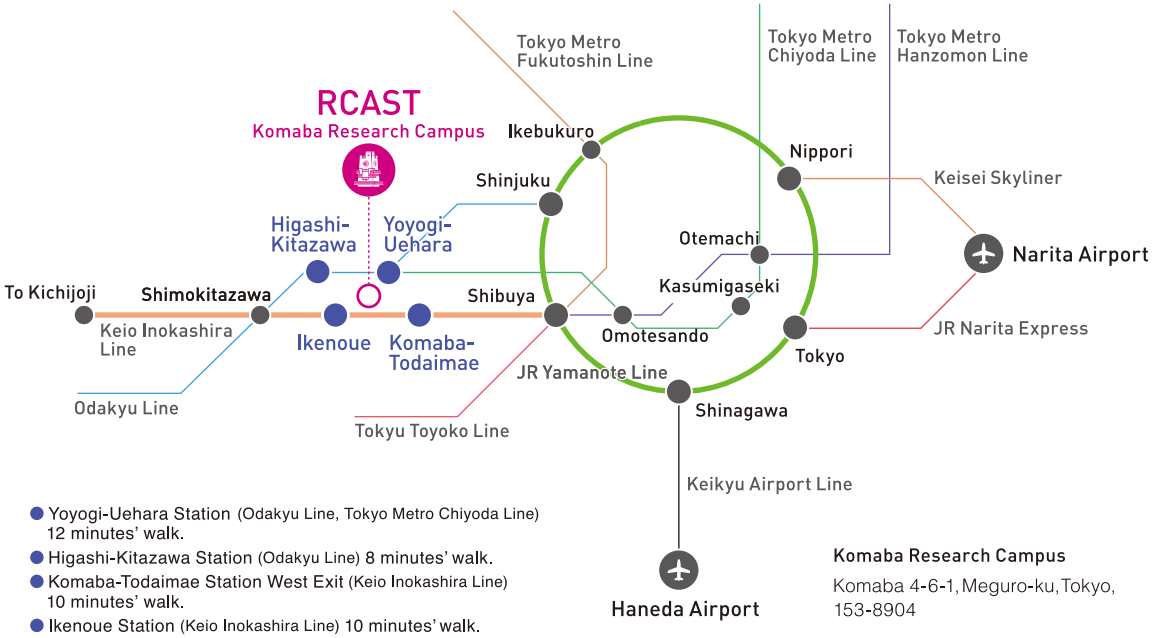


Building 4

Completed in 1999, this was the first building constructed under the new campus plan, which called for older buildings, except those of historical value, to be demolished and rebuilt anew. It was designed by Hiroshi Hara, who also designed buildings for the Institute of Industrial Science on the same campus.

ACCESS

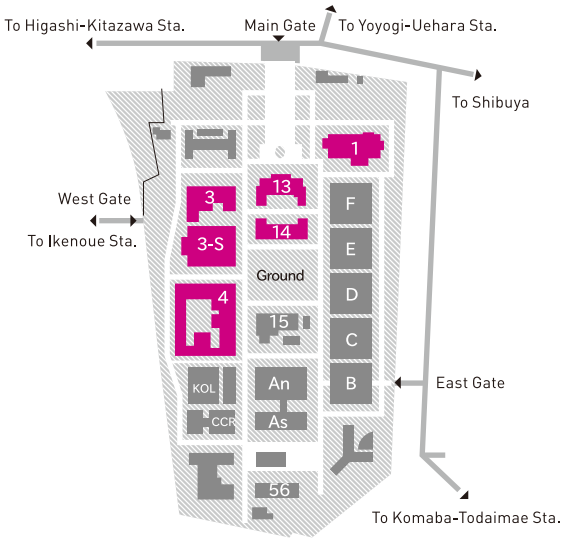


- Yoyogi-Uehara Station (Odakyu Line, Tokyo Metro Chiyoda Line) 12 minutes' walk.
- Higashi-Kitazawa Station (Odakyu Line) 8 minutes' walk.
- Komaba-Todaimae Station West Exit (Keio Inokashira Line) 10 minutes' walk.
- Ikenoue Station (Keio Inokashira Line) 10 minutes' walk.

Komaba Research Campus

Komaba 4-6-1, Meguro-ku, Tokyo, 153-8904

Komaba Research Campus




Building 13


Building 1


Building 3


Building 3 South


Building 4


Building 14

■ Research Center for Advanced Science and Technology

Financial support for research challenges

Your donations are invaluable in helping us to extend creative research activities and accelerate our efforts to solve society's problems.

https://www.rcast.u-tokyo.ac.jp

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東京大学 THE UNIVERSITY OF TOKYO