The purpose of Strategic Basic Research Programs is to promote challenges to basic research to overcome the problems facing our country and to produce creative and innovative technology seeds (new technology seeds) based on new scientific knowledge that will lead to scientific and technological innovations to transform society and the economy. For this purpose, we establish virtual research institutes (set up for a limited period of time across several organizations) consisting of researchers from various universities, colleges, enterprises, public institutions, etc. The researchers construct networks with other researchers and relevant parties from industry and society in general—who will be among the beneficiaries of the results of the research—in order to advance research under the supervision of a program officer (e.g., Research Supervisor) who will head the institute.

What are Strategic Basic Research Programs?

The Strategic Objectives established by the national government to achieve solutions for key issues Japan is facing:

- Construction and operation of research institutes

  - Program Director oversees the overall system and considers management direction
  - Establishment of Research Areas and Program Officers (Research Supervisor, Directors for ERATO, etc.)
  - Identification of researchers with exceptional pioneering qualities and originality, based on the Program Officer’s judgment
  - Flexible, dynamic decision-making on research plans and research funding allocation in accordance with research progress achieved and other factors

  Creating the Seeds for New Technology (CREST, PRESTO, ACT-X, ERATO)

  Advanced Technologies for Carbon-Neutral (ALCA-Next)

- CREST
  - Team-type research to produce excellent achievements leading to scientific and technological innovation
  - Research period: 5 years and 6 months or less
  - Research budget: Total of 150-500 million yen / team

- PRESTO
  - Individual-type research to develop the sources of scientific and technological innovation
  - Research period: 3 years and 6 months or less
  - Research budget: Total of 30-40 million yen / project

- ACT-X
  - Individual-type research that supports “the establishment of an individual,” i.e., young researchers with unique and challenging ideas
  - Research period: 2 years and 6 months or less
  - Research budget: Total of several million yen / project
  - In the acceleration phase, maximum research funds of approximately 10 million yen / year

- ERATO
  - Large-scale group research led by excellent leaders toward creating new tides of science and technology
  - Research period: Approximately 5 years
  - Research budget: Total of 1.2 billion yen / project

- ALCA-Next
  - Generating innovative technologies that will contribute to the realization of carbon neutrality
  - Research period: 3.5 years for the small phase and 3 years for the accelerated phase
  - Research budget: Up to 25 million yen / year and project (small phase), and up to 75 million yen / year and project (accelerated phase)

Toward the Creation of Innovation in Science and Technology
Program Directors

Mitsuo SAWAMOTO  Special Appointed Professor, Frontier Research Institute, Chubu University
Michiko IGARASHI  Freelance Journalist
Atsushi KUMANOGOH  Dean, Graduate School of Medicine, Osaka University
Jun-ichi TSUJII  Fellow, The National Institute of Advanced Industrial Science and Technology
Yoshiro HIRAYAMA  Director, SIP Research Promotion Center, QST (National Institutes for Quantum Science and Technology)  Professor Emeritus, Tohoku University
Kazuya MASU  President, Tokyo Institute of Technology

updated April 2023

Feature of SBRP: Top-down research programs

Top-down type

Strategic Basic Research Programs
Japan Science and Technology Agency (JST)

Designate Research Areas and Research Supervisors to achieve Strategic Objectives defined by the government

Select research projects and promote strategic basic research

Produce creative and innovative technology seeds leading to scientific and technological innovations

Bottom-up type

Grants-in-Aid for Scientific Research (KAKENHI)
Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Japan Society for the Promotion of Science (JSPS)

Promote various types of academic work through research activities

Support for academically distinguished, original, pioneering research

Research proposals based on the free ideas of the researcher
The purpose of CREST is promoting unique, internationally high-level basic research to address the important problems facing our country and to produce creative, conspicuous, and innovative technology seeds (new technology seeds) based on new scientific knowledge that contributes to scientific and technological innovation that can transform the society and economy.

Under the management principles of the Research Area specified by the Research Supervisor, the best teams led by top-level researchers in our country selected by the Research Supervisor train the young researchers in a team while advancing the progress of research.

Research Supervisors call for research proposals based on the Research Areas they manage, adopting 10 to 20 research projects in each area. Research Supervisors consider the field of science and technologies and the balance between the science and scientific and technological innovation, which constitute the portfolio of the whole Research Area. For this purpose, we call for proposals several times separately and criteria for accepting proposals are clarified each time in the application requirements. When calling for research proposals, the requirements may include the participation of researchers from industry and/or the fields of culture and social science to advance basic research with a specific goal. Furthermore, the requirements may include the organization of teams from different academic fields for more challenging research projects.

To achieve Strategic Objectives, a Research Supervisor can flexibly design a Research Area at his/her discretion including specifying the number of the research projects in the Research Area and the size of the budget for each research project and introducing the stage gates during the period of a research as well as some reorganization of a team.

Research Supervisors call for research proposals based on the Research Areas they manage, adopting 10 to 20 research projects in each area. Research Supervisors consider the field of science and technologies and the balance between the science and scientific and technological innovation, which constitute the portfolio of the whole Research Area. For this purpose, we call for proposals several times separately and criteria for accepting proposals are clarified each time in the application requirements. When calling for research proposals, the requirements may include the participation of researchers from industry and/or the fields of culture and social science to advance basic research with a specific goal. Furthermore, the requirements may include the organization of teams from different academic fields for more challenging research projects.

We will adopt the best teams and Research Directors to maintain a high level of research internationally. In order for top-level researchers to produce results by collaborating with other researchers, we support each research project using a fund typically worth several hundred million yen.

In order to maximize achievements, our Research Supervisors adopt a flexible management approach by giving instructions on changing, accelerating, or cancelling research projects depending on their progress. We assign about ten Research Area Advisors to support Research Areas by giving advice and performing evaluations in terms of science and technology. In addition, we have experts who can give advice from a legal point of view such as lawyers and experts from industry when needed.

In each research project, the development of post-doctoral researchers and students in the team is also an important mission as well as the realization of proposals.
On-going Research Areas

<table>
<thead>
<tr>
<th>Research Area</th>
<th>Research Supervisor</th>
<th>Fiscal Year</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Innovation</td>
<td><strong>Innovation</strong> in chemical reactions through active control of electrons and ions for production of advanced materials</td>
<td>Hyoryu Ryu, Project Professor, Organization for Research Promotion, Osaka Metropolitan University</td>
<td>12</td>
</tr>
<tr>
<td>Nanotechnology &amp; Materials</td>
<td><strong>Energy Harvesting</strong></td>
<td>Kenji Taniguchi, Emeritus Professor, Osaka University</td>
<td>24</td>
</tr>
<tr>
<td><strong>Research Areas</strong></td>
<td><strong>Cell Control</strong></td>
<td>Atsushi Miyawaki, Laboratory Head, Center for Brain Science/Advanced Photonics, RIKEN</td>
<td>-</td>
</tr>
<tr>
<td><strong>Research Projects</strong></td>
<td><strong>MultiSensing</strong> Research on Multi-sensing Biosystems and Development of Adaptive Technologies</td>
<td>Ryusuke Nagai, Atsushi Hiki</td>
<td>11</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td><strong>Cell Dynamics</strong> Spatial biology of intracellular components</td>
<td>Toshiyuki Endo, Professor, Faculty of Life Sciences, Kyorio Sango University</td>
<td>16</td>
</tr>
<tr>
<td><strong>Fundamental</strong></td>
<td><strong>Fundamental Technologies for COVID-19</strong> Creation of fundamental technologies by interdisciplinary research to combat with infectious diseases including COVID-19</td>
<td>Akiko Iwamoto, Director, Office of Project Management, Japan Agency for Medical Research and Development</td>
<td>10</td>
</tr>
<tr>
<td><strong>Multicellular</strong></td>
<td><strong>MultiCellular Interaction</strong> for quantitative analysis of spatiotemporal multicellular interaction</td>
<td>Michiyuki Matsuda, Professor, Graduate School of Biostudies, Kyorio University</td>
<td>16</td>
</tr>
<tr>
<td><strong>Genome</strong></td>
<td><strong>Genome Programming</strong></td>
<td>Haruhiko Sotomi, Professor, Kao University School of Medicine</td>
<td>19</td>
</tr>
<tr>
<td><strong>Extracellular</strong></td>
<td><strong>Extracellular Fine Particles</strong> Stimulation of biological mechanisms in extracellular fine particles and the control system</td>
<td>Yoshiro Baba, Professor, School of Engineering, Nagoya University</td>
<td>16</td>
</tr>
<tr>
<td><strong>Opt Bio</strong></td>
<td><strong>Robustness in Plants</strong> Development and Application of Optical Technology for Spatiotemporal Control of Biological Functions</td>
<td>Naoto Tabata, Director and Chairperson of the Board of Trustees, Kasumigaura DNA Research Institute</td>
<td>12</td>
</tr>
<tr>
<td><strong>Nano-Material Semiconductors</strong></td>
<td><strong>Nano-Material Semiconductors</strong> Fundamental Technology for Semiconductor Device Structures Using Nanomaterials</td>
<td>Hirohito Saito, Emeritus Professor, Tohoku University</td>
<td>-</td>
</tr>
<tr>
<td><strong>Quantum</strong></td>
<td><strong>Quantum Frontiers</strong> Exploring Quantum Frontiers Through Quantum-Clasically Interfaced Fusion Systems</td>
<td>Nobuyuki Imoto, Professor, Office of Center Professor, The University of Tokyo</td>
<td>-</td>
</tr>
<tr>
<td><strong>Degradation and Stability</strong></td>
<td><strong>Degradation and Stability</strong> Precise Material Science for Degradation and Stability</td>
<td>Atsushi Takahara, Research Professor, Research Center for Negative Emission Technology, Kyoto University</td>
<td>11</td>
</tr>
<tr>
<td><strong>Exploring Unknown Materials</strong></td>
<td><strong>Exploring Unknown Materials</strong></td>
<td>Hiroshi Kitagawa, Professor, Graduate School of Science, Kyoto University</td>
<td>11</td>
</tr>
<tr>
<td><strong>Precise arrangement to functional materials</strong></td>
<td><strong>Precise arrangement to functional materials</strong></td>
<td>Nobuo Kimizuka, Professor, Graduate School of Engineering, Kyorio University</td>
<td>15</td>
</tr>
<tr>
<td><strong>Information Carriers</strong></td>
<td><strong>Information Carriers</strong> Integrated Devices and Systems Utilized by Information Carriers</td>
<td>Toshio Hiramoto, Professor, Institute of Industrial Science, The University of Tokyo</td>
<td>15</td>
</tr>
<tr>
<td><strong>Innovative optics and photonics</strong></td>
<td><strong>Innovative optics and photonics</strong> Creating innovative optics and photons based on creative principles</td>
<td>Satoshi Kawata, Professor Emeritus, Osaka University</td>
<td>14</td>
</tr>
<tr>
<td><strong>Nanomechanics</strong></td>
<td><strong>Nanomechanics</strong> Exploring nanomechanical properties based on understanding nanoscale dynamics for innovative mechanical materials</td>
<td>Koziro Itô, Professor, Graduate School of Frontier Sciences, The University of Tokyo</td>
<td>15</td>
</tr>
<tr>
<td><strong>Topography</strong></td>
<td><strong>Topography</strong> Creation of Topology based on the Topological Materials Science for Innovative Devices</td>
<td>Masahito Ueda, Professor, School of Science, The University of Tokyo</td>
<td>14</td>
</tr>
<tr>
<td><strong>Thermal Control</strong></td>
<td><strong>Thermal Control</strong> Creation of Innovative Core Technologies for Nano-enabled Thermal Management</td>
<td>Shingo Mano, Professor, School of Engineering, The University of Tokyo</td>
<td>13</td>
</tr>
<tr>
<td><strong>Revolutionary Materials Development</strong></td>
<td><strong>Revolutionary Materials Development</strong> Revolutionary Material Development by Exploration of Strong Experiments with Theory/Data Science</td>
<td>Hideo Hosono, Honorary Professor &amp; Institute Professor, MDK Research Center for Element Materials Science, Institute of Technology</td>
<td>13</td>
</tr>
<tr>
<td><strong>Innovative Measurement and Analysis</strong></td>
<td><strong>Innovative Measurement and Analysis</strong></td>
<td>Yoshinori Amemiya, Emeritus Professor, Institute of Statistical Mathematics, Research Organization of Information and Systems</td>
<td>16</td>
</tr>
<tr>
<td><strong>Quantum Technology</strong></td>
<td><strong>Quantum Technology</strong> Creation of an Innovative Quantum Technology Platform Based on the Advanced Control of Quantum States</td>
<td>Yasunari Kogawa, Specially Appointed Professor, Institute for Nano Quantum Information Electronics, The University of Tokyo</td>
<td>19</td>
</tr>
<tr>
<td><strong>Advanced Photonics</strong></td>
<td><strong>Advanced Photonics</strong></td>
<td>Ken-ichi Kitayama, Professor Emeritus, Osaka University</td>
<td>16</td>
</tr>
<tr>
<td><strong>Innovative Catalysis</strong></td>
<td><strong>Innovative Catalysis</strong> Innovative Catalysis and Creation Technologies for the Utilization of Diverse Natural Resources</td>
<td>Wataru Udaka, Special Professor of Chemistry, Laboratory of Chemistry, Kansai University</td>
<td>12</td>
</tr>
<tr>
<td><strong>Innovative Measurement and Analysis</strong></td>
<td><strong>Innovative Measurement and Analysis</strong></td>
<td>Takashi Wasaki, Assistant Professor, The Institute of Scientific and Industrial Research, Osaka University</td>
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<tr>
<td><strong>Society 5.0</strong></td>
<td><strong>Society 5.0</strong> Creation of System Software for Society 5.0 by Integrating Fundamental Theories and System Platform Technologies</td>
<td>Yasuo Ohkabe, Professor, Director, Advanced Center for Computing and Media Studies, Kyoto University</td>
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<tr>
<td><strong>Bio-DX</strong></td>
<td><strong>Bio-DX</strong> Innovation of life science through digital transformation focused on data-driven and AI-driven technologies</td>
<td>Yasushi Okada, Team Leader, Center for Ecosystem Dynamics Research, RIKEN/Professor, Graduate School of Medicine, The University of Tokyo</td>
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<tr>
<td><strong>Trusted Quality AI Systems</strong></td>
<td><strong>Trusted Quality AI Systems</strong> Core technologies for trusted quality AI systems</td>
<td>Aiko Azawa, Professor, Digital Content and Media Sciences Research Division, National Institute of Informatics, Research Organization of Information and Systems</td>
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<tr>
<td><strong>Mathematical Information</strong></td>
<td><strong>Mathematical Information</strong> Creating information utilization platform by integrating mathematical and information sciences and development to society</td>
<td>Nazoni Udaka, Director for AMI Center for Advanced Intelligence Project Working Fellow, NTT Communication Science Laboratories</td>
<td>14</td>
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<tr>
<td><strong>Computational Foundation</strong></td>
<td><strong>Computational Foundation</strong> Technology for Computing Revolution for Society 5.0</td>
<td>Shuichi Sakai, Professor, Graduate School of Information Science and Technology, The University of Tokyo</td>
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</tr>
<tr>
<td><strong>Symbiotic Interaction</strong></td>
<td><strong>Symbiotic Interaction</strong> Creation and Development of Core Technologies, Interfacing Human and Information Environments</td>
<td>Kenji Masui, Emeritus Professor, Nagoya University</td>
<td>16</td>
</tr>
<tr>
<td><strong>Artificial Intelligence</strong></td>
<td><strong>Artificial Intelligence</strong> Development and Integration of Artificial Intelligence Technologies for Innovation Acceleration</td>
<td>Minoru Etoh, Professor, Open and Transdisciplinary Research Institute, Osaka University</td>
<td>29</td>
</tr>
</tbody>
</table>
Individual-type research to develop the sources of scientific and technological innovation

**Overview**

The purpose of PRESTO is promoting unique and challenging, internationally high-level basic research to address the important problems facing our country and to produce creative and innovative technology seeds (new technology seeds) based on new scientific knowledge as a source of scientific and technological innovation that can transform society and the economy. For this purpose, under the management principles of the Research Area specified by the Research Supervisor, young researchers selected by the Research Supervisor form a network with researchers inside and outside of the Research Areas to promote challenging and independent research.

**Characteristics**

- Research Supervisors call for research proposals based on the Research Areas they manage, adopting 30 to 40 research projects in each area. Research Supervisors consider the balance between the science and scientific and technological innovation as they establish networks of researchers with different viewpoints in a Research Area or across Research Areas by accepting a variety of researchers and portfolios. For this purpose, we call for proposals several times separately and criteria for accepting proposals are clarified each time in the application requirements.

- Approximately 40 million yen has been allocated to support each research project, which is sufficient to enable young researchers to pursue/conduct their independent projects. Moreover, we give support to help young researchers become independent as well as organize the research environment.

- We expect young researchers to not only produce results but also develop themselves as researchers. For this purpose, in PRESTO, Research Supervisors and Research Area Advisors give advice and guidance through area meetings held once or twice a year, and visits to the laboratories of PRESTO researchers. Furthermore, we provide a variety of support services to promote research, including exchanges with overseas researchers and opportunities that let young researchers review their research from the viewpoint of science in society depending on necessity.

- In order to maximize achievements, our Research Supervisors adopt a flexible management approach by giving instructions to PRESTO researchers on changing, accelerating, or cancelling research depending on their progress. We assign about ten Research Area Advisors to support Research Areas by giving advice and perform evaluations in terms of science and technology. In addition, we have experts who can give advice from a legal point of view such as lawyers, and other experts from industry when needed.

**Research Framework**

Japanese Government (MEXT)

![Research Framework Diagram](image-url)
<table>
<thead>
<tr>
<th>Research Area</th>
<th>Research Supervisor</th>
<th>Deputy Research Supervisor</th>
<th>Fiscal Year</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Conversion</td>
<td>Ichiro Yamazaki, Professor, School of Materials and Chemical Technology, Tokyo Institute of Technology</td>
<td></td>
<td>2023</td>
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<td>Complex Flow</td>
<td>Susumu Tonegawa, Professor, Graduate School of Engineering Science, Osaka University</td>
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<td>2023</td>
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<tr>
<td>Controlled Reaction</td>
<td>Yasushi Sakine, Professor, Faculty of Science and Engineering, Waseda University</td>
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<td>2023</td>
<td>31</td>
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<tr>
<td>Blue Biosphere</td>
<td>Jotte Kanda, Professor, Department of Ocean Sciences, Tokyo University</td>
<td></td>
<td>2023</td>
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<td>Aging</td>
<td>Naoki Mochizuki, Director, Research Institute for the Aging and the Population, Rikkyo University</td>
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<td>2023</td>
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<tr>
<td>Pandemic Resilience</td>
<td>Hitoshi Oshitani, Professor, Graduate School of Medicine, Tohoku University</td>
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<td>2023</td>
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<td>Multisensory Integration</td>
<td>Ryozo Nagai, President, Tokyo Medical University</td>
<td></td>
<td>2023</td>
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<td>Plant molecules</td>
<td>Kazuhiro Nishihara, Professor, Faculty of Science, Kanagawa University</td>
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<td>2023</td>
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<td>Supra-assembly of Biomolecules</td>
<td>Hiroyuki Nogi, Professor, Graduate School of Engineering, The University of Tokyo</td>
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<td>2023</td>
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<td>Multicellular System</td>
<td>Yoshihiro Takahashi, Professor, Graduate School of Science, Kyoto University</td>
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<td>2023</td>
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<tr>
<td>Genome Programming</td>
<td>Harunobu Usuda, Professor, Keio University</td>
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<td>2023</td>
<td>31</td>
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<tr>
<td>Nano Materials Devices</td>
<td>Yoshihiro Iwai, Professor, School of Engineering, The University of Tokyo</td>
<td></td>
<td>2023</td>
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<tr>
<td>Quantum Frontiers</td>
<td>Nobuyuki Imoto, Project Professor, Office of Senior Professor, The University of Tokyo</td>
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<td>2023</td>
<td></td>
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<tr>
<td>Nano Cooperation</td>
<td>Kansuke Kobayashi, Graduate School of Science, The University of Tokyo</td>
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<td>2023</td>
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<td>Sustainable Materials</td>
<td>Tadahisa Iwata, Professor, Graduate School of Agricultural and Life Sciences, The University of Tokyo</td>
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<td>2023</td>
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<td>Future Materials</td>
<td>Hiroshi Kageyama, Professor, Graduate School of Engineering, Kyoto University</td>
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<td>2023</td>
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<td>Precise Molecular Arrangement</td>
<td>Hiroshi Nishihara, Professor, Research Institute for Science and Technology, Tokyo University</td>
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<td>2023</td>
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</tr>
<tr>
<td>Information Carriers</td>
<td>Hitoshi Wakabayashi, Professor, School of Engineering, Tokyo Institute of Technology</td>
<td></td>
<td>2023</td>
<td>30</td>
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<tr>
<td>Innovative optics and photonics</td>
<td>Koichiro Tanaka, Professor, Graduate School of Science, Kyoto University</td>
<td></td>
<td>2023</td>
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<tr>
<td>Nanomechanics</td>
<td>Takayuki Kitamura, Special Assistant to the President, Tokyo University</td>
<td></td>
<td>2023</td>
<td>31</td>
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<tr>
<td>Quantum Software</td>
<td>Akiko Tomita, Professor, Faculty of Information Science and Technology, Hokkaido University</td>
<td></td>
<td>2023</td>
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<tr>
<td>Topology</td>
<td>Shuichi Murakami, Professor, School of Science, Tokyo Institute of Technology</td>
<td></td>
<td>2023</td>
<td>32</td>
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<tr>
<td>Measurement and Analysis Foundation</td>
<td>Isao Tanaka, Professor, Department of Materials Science and Engineering, Kyoto University</td>
<td></td>
<td>2023</td>
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<td>Human-Centered Interaction</td>
<td>Hidenori Tachibana, Professor, Graduate School of Information Science and Technology, The University of Tokyo</td>
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<td>2023</td>
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<td>Social Transformation Platform</td>
<td>Satoshi Kurahara, Professor, Faculty of Science and Technology, Keio University</td>
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<td>2023</td>
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<td>Platform Software</td>
<td>Toru Higashino, Vice-President, Kyushu University</td>
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<td>2023</td>
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<td>Trustworthy AI</td>
<td>Hiroki Anzai, Professor, Graduate School of Information Science and Technology, Hokkaido University</td>
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<td>2023</td>
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<td>Math-Structure</td>
<td>Takashi Sakai, Professor, Graduate School of Science, Kyoto University</td>
<td></td>
<td>2023</td>
<td>31</td>
</tr>
<tr>
<td>IoT</td>
<td>Hideyuki Tokuda, President, National Institute of Information and Communications Technology</td>
<td></td>
<td>2023</td>
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</tr>
<tr>
<td>Computing Frontiers</td>
<td>Koji Inoue, Professor, Faculty of Information Science and Electrical Engineering, Kyushu University</td>
<td></td>
<td>2023</td>
<td>30</td>
</tr>
</tbody>
</table>
ACT-X

Individual-type research that supports "the establishment of an individual," i.e., young researchers with unique and challenging ideas

Overview

The purpose of ACT-X is finding and developing superior young researchers to address important problems facing our country. Under the management principles of the Research Area defined by the Research Supervisor, we find researchers who have challenging ideas. We give aid to research aimed at creating new values that lead to scientific and technological innovation. With advice and guidance from the Research Supervisor and Research Area Advisor, young researchers advance based on their unique ideas. As they communicate with researchers from different fields inside or outside the Research Area, young researchers attempt to establish themselves as researchers while forming a network of researchers.

Characteristics

- We support young researchers (including graduate school students) who have had their doctorate for less than 8 years (or researchers who are bachelor’s degree holders for less than 13 years; excluding periods of maternity leave and parental leave).
- Research Supervisors call for research proposals based on the Research Areas they manage, adopting 60 to 90 research projects in each area. We consider the balance between science and technology fields when accepting a variety of researchers. Thus, we give them support by forming networks of researchers with different viewpoints in a Research Area or across Research Areas. For this purpose, we call for proposals several times separately. Our criteria for accepting proposals are clarified each time in the application requirements.
- Several million yen has been allocated to support each research project, which is sufficient to enable young researchers to begin working on their unique and challenging ideas, and pursue their independent research projects.
- In order to maximize achievements, our Research Supervisors adopt a flexible management approach by giving instructions to ACT-X researchers on changing, accelerating, or cancelling research depending on their progress. We assign about ten Research Area Advisors to support Research Areas. We also have experts who give advice and perform evaluations in terms of science and technology. In addition, we have experts from industry who can give advice from a variety of viewpoints. To help young researchers establish themselves as independent entities, we assign each ACT-X researcher to a Research Area advisor who also plays the role of a mentor. Furthermore, Research Supervisors and Research Area Advisors give advice and guidance through area meetings held once or twice a year, and by visiting the laboratories of ACT-X researchers.

Research Framework

Japanese Government (MEXT)

Research Area

Distribution of Position Backgrounds at Application Time

Average age at application time in 2022: 30.3 years old
- Assistant professor 49.4%
- Associate professor 3.4%
- Lecturer 2.2%
- Graduate student 18.0%
- Researcher 25.8%
- Other 1.1%

On-going Research Areas

<table>
<thead>
<tr>
<th>Research Area</th>
<th>Research Supervisor</th>
<th>Fiscal Year</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans-Scale Approach Toward Materials Innovation</td>
<td>Masayuki TAKEUCHI</td>
<td>2020-2023</td>
<td>19</td>
</tr>
<tr>
<td>Innovations in Mathematical and Information Sciences to Build the Next-Generation AI</td>
<td>Takahiro HARA</td>
<td>2019-2023</td>
<td>21</td>
</tr>
<tr>
<td>Life Phenomena and Materials</td>
<td>Yoko TOYOSHIMA</td>
<td>2021-2023</td>
<td>42</td>
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<tr>
<td>Hardware in Future for Resilience of Real Space</td>
<td>Shoji TANAKA</td>
<td>2020-2023</td>
<td>70</td>
</tr>
<tr>
<td>Environments and Biotechnology</td>
<td>Nobuhiko NCMURA</td>
<td>2020-2023</td>
<td>71</td>
</tr>
<tr>
<td>AI powered Research Innovation / Creation</td>
<td>Yasuo KUNISYSHI</td>
<td>2020-2023</td>
<td>60</td>
</tr>
<tr>
<td>Life and Chemistry</td>
<td>Mikio SODEOKA</td>
<td>2020-2023</td>
<td>86</td>
</tr>
<tr>
<td>Frontier of mathematics and information science</td>
<td>Kenichi KAWARABAYASHI</td>
<td>2020-2023</td>
<td>19</td>
</tr>
</tbody>
</table>

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As of July 2023

Accleration Phase Only
Virtual Laboratory Integrating Researches in AIP Project

Overview

As a research organization executing the AIP Project* supported by MEXT, JST promotes unique research activities leading to new innovations utilizing the framework of our Strategic Basic Research Programs. We combine multiple research areas to build a virtual laboratory (i.e. a network laboratory) and unlock the potential of the AIP Project by closely collaborating with RIKEN.

* The AIP (Advanced Integrated Intelligence Platform) Project is an initiative leveraging innovative AI technologies to conduct integrated research and development activities on big data, IoT, and cyber security. The project is executed by JST and RIKEN.

Characteristics

Integration of Research Areas
AIP Network Lab is to fund prominent researchers to support innovative research projects and to maximize the outcome in the strategic basic research program. It also promotes joint researches across research areas in a wide range of research phases, including topic selection and research promotion.

Integration Operation with RIKEN
AIP Network Lab actively shares research results and researchers with RIKEN AIP Center to enable consistent research and development activities from basic research to real-world applications.

Direction of Laboratory
1. Find and support innovative frontier researches in AI related areas and demonstrate their presences.
2. Actively disseminate research results internationally and contribute to the progress of AI related research areas.
3. Support collaborative research within the AIP Network Lab, and create new value.
4. Work on the entire lab to develop and educate young researchers.

Research Areas of AIP Network Laboratory (FY2023)

Laboratory Director: Katsumi EMURA (Fukushima Institute for Research, Education and Innovation, Vice President)

CREST

- Creation of System Software for Society 5.0 by Integrating Fundamental Theories and System Platform Technologies (Yasuo OKABE)
- Innovation of Life Science through Digital Transformation Focused on Data-Driven and AI-Driven Technologies (Yasushi OKADA)
- Core Technologies for Trusted Quality AI Systems (Atsuki AIZAWA)
- Creating Information Utilization Platform by Integrating Mathematical and Information Sciences, and Development to Society (Naonori UEDA)
- Creation and Development of Core Technologies Interfacing Human and Information Environments (Kenji MASE)
- Development and Integration of Artificial Intelligence Technologies for Innovation Acceleration (Minoru ETOH)

PRESTI

- Creating Human-Centered Interaction to Solve Social Issues (Hideaki KUZUOKA)
- Co-Creation of the transformation platform technology for human and society by integration of the humanities and sciences (Satoshi KURINOHARA)
- Strengthening ICT Infrastructure for Social Change (Teruo HIGASHINO)
- The Fundamental Technologies for Trustworthy AI (Hiroki ARIMURA)
- Future Led by IoT (Hideyuki TOKUDA)
- Elucidating Mathematical Structures in Real/Virtual World Objects and Their Utilization (Takashi SAKAJI)

ACTX

- Innovations in Mathematical and Information Sciences to Build the Next-Generation AI (Takahiro HARA)
- AI Powered Research Innovation / Creation (Yasuo KUNIYOSHI)
- Frontier of Mathematics and Information Science (Ken-ichi KAWARABAYASHI)

*Research Supervisor

Department of Strategic Basic Research +81-3-3512-3526
https://www.jst.go.jp/kisoken/aip/en/
Large-scale group research led by excellent leaders toward creating new tides of science and technology

Overview

Exploratory Research for Advanced Technology (ERATO) is a research funding program with a long history, first launched in 1981. The program aims to promote challenging basic research through the integration of different fields across existing research areas and/or on new approaches with a large amount of research funds, and thus promote the formation of the new tides of science and technology that lead to scientific and technological innovation in the future and contribute to the accomplishment of Strategic Objectives. For this purpose, there are characteristics that enable Research Directors, as the managers in all aspects, to design Research Areas (research projects) based on unique concepts and organize three to four research groups comprising different fields and/or functions by gathering researchers with different specialties and/or research projects to develop new fields.

Characteristics

- ERATO is a research system with "human" cores, in which the uniqueness and leadership of Research Directors are significant, while the young researchers involved are encouraged to exercise a certain amount of discretion.
- The Research Directors design Research Areas (research projects) based on unique concepts and deal with the development of new fields. It is possible to have one or two Co-Research Director(s) who manages the project in cooperation with the Research Director for the projects selected in 2018 or thereafter.
- The efforts to bring together excellent researchers from various fields, backgrounds, organizations, and nationalities are significant. Each project establishes three to four research groups in different fields and/or functions with the Research Director at the core. The projects contribute not only to the development of new fields but also to the development of young researchers. Those who participated in the past projects are active in various fields.
- JST, in cooperation with the organizations to which the Research Directors belong, along with its dedicated staff, support the establishment of new research organizations and the management of research bases that are independent from existing organizations.
- ERATO allows a flexible management approach toward research projects, enabling changing budgets and plans depending on the progress of research.

Research Framework

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## On-going Research Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Research Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARITA Lipidome Atlas</td>
<td>Makoto ARITA</td>
</tr>
<tr>
<td>SUZUKI RNA Modification</td>
<td>Tsutomu SUZUKI</td>
</tr>
<tr>
<td>UEDA Biological Timing</td>
<td>Hori R. UEDA</td>
</tr>
<tr>
<td>KURUMIZAKA Chromatin Atlas</td>
<td>Hitoshi KURUMIZAKA</td>
</tr>
<tr>
<td>FUKATSU Evolving Symbiosis</td>
<td>Takema FUKATSU</td>
</tr>
<tr>
<td>IEGAYA Brain-Al Hybrid</td>
<td>Yuji IEGAYA</td>
</tr>
<tr>
<td>HAMACHI Innovative Molecular Technology for Neuroscience</td>
<td>Itaru HAMACHI</td>
</tr>
<tr>
<td>MIZUSHIMA Intracellular Degradation</td>
<td>Noboru MIZUSHIMA</td>
</tr>
<tr>
<td>UCHIDA Magnetic Thermal Management Materials</td>
<td>Ken-ichi UCHIDA</td>
</tr>
<tr>
<td>SHIBATA Ultra-atomic Resolution Electron Microscopy</td>
<td>Naoya SHIBATA</td>
</tr>
<tr>
<td>KATAOKA Line X-ray and Gamma-ray Imaging</td>
<td>Jun KATAOKA</td>
</tr>
<tr>
<td>NOZAKI Resin-Degradation Catalyst</td>
<td>Kyoko NOZAKI</td>
</tr>
<tr>
<td>YAMAUCHI Materials Space-Tectonics</td>
<td>Yusuke YAMAUCHI</td>
</tr>
<tr>
<td>MAEDA Artificial Intelligence in Chemical Reaction Design and Discovery</td>
<td>Satoshi MAEDA</td>
</tr>
<tr>
<td>YAMAMOTO Atom Hybrid</td>
<td>Kihisa YAMAMOTO</td>
</tr>
<tr>
<td>HASUO Metamathematics for Systems Design</td>
<td>Ichiro HASUO</td>
</tr>
</tbody>
</table>

### Research Term

<table>
<thead>
<tr>
<th>Year</th>
<th>Research Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-16</td>
<td>17 18 19</td>
</tr>
<tr>
<td>20</td>
<td>21 22 23 24 25 26 27</td>
</tr>
</tbody>
</table>

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**Life Innovation**  **Nanotechnology & Materials**  **Information and Communication Technology**

Additional Research Period: Depending on the project's development and the host research institution's commitment, an extension period, “Additional Research Period,” can be granted up to three years continuously after the original five-year project period.

As of July 2023
Overview

This program promotes basic research on innovative technologies that are not just extensions of conventional technologies and that will bring about discontinuous innovation, with the aim of contributing to the realization of carbon neutrality by 2050.

Characteristics

- Covering a wide range of research fields that realizing carbon neutrality
- Actively adopting challenging proposals based on unconventional ideas of individual researchers
- Fostering technological seeds by improving the levels of technology maturity (TRL) through "stage-gate evaluation", and etc.
- Accelerating R&D and bridging the gap by collaborating with other projects such as Green Technologies for Excellence (GteX)*


ALCA-Next Technology Areas

- "Energy Storage" Area
- "Energy Conversion" Area
- "Resource Circulation" Area
- "Green Biotechnology" Area
- "Semiconductor" Area
- "Green Computing and DX" Area

Program Director (PD) , Program Officer (PO)

Program Director (PD)

UOYAKI Kohei

Professor Emeritus, Hokkaido University/Emeritus Fellow, National Institute for Materials Science/Principal Fellow, CRDS, JST

Program Officer (PO)

<table>
<thead>
<tr>
<th>Technology Area</th>
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</tr>
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<tbody>
<tr>
<td><em>Energy Storage</em> Area</td>
<td>WATANABE Masayoshi (Distinguished YNU Professor, Institute of Advanced Sciences, Yokohama National University)</td>
</tr>
<tr>
<td><em>Energy Conversion</em> Area</td>
<td></td>
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Program Officer (PO)

| "Energy Storage" Area                | WATANABE Masayoshi (Distinguished YNU Professor, Institute of Advanced Sciences, Yokohama National University) |
| "Energy Conversion" Area             |                                                                                      |
| "Resource Circulation" Area          |                                                                                      |
| "Green Biotechnology" Area           |                                                                                      |
| "Semiconductor" Area                 |                                                                                      |
| "Green Computing and DX" Area        |                                                                                      |

Stage-gate evaluation

R&D will be conducted in stages, begins at a “small phase” in which a large number of relatively small amount of proposal adopted (“starting small”) to an “accelerated phase” in which those proposal narrowed down and concentrated investment is made.

Department of R&D for Future Creation

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https://www.jst.go.jp/alca/ (Japanese only) alca-next@jst.go.jp
Generating innovative technologies that will contribute to the realization of carbon neutrality. This program promotes basic research on innovative technologies that are not just extensions of conventional technologies and that will bring about discontinuous innovation, with the aim of contributing to the realization of carbon neutrality by 2050.

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**ADVANCED TECHNOLOGIES FOR CARBON-NEUTRAL**

Covering a wide range of research fields that realizing carbon neutrality

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**ALCA-Next**

Department of R&D for Future Creation

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[https://www.jst.go.jp/alca/](https://www.jst.go.jp/alca/) (Japanese only)  alca-next@jst.go.jp

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- Program Director (PD)
  - UOSAKI Kohei
    - Professor Emeritus, Hokkaido University/Emeritus Fellow, National Institute for Materials Science/Principal Fellow, CRDS, JST
- Program Officer  (PO)

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**Feature of SBRP : Extensive program management**

In Strategic Basic Research Programs, the Research Area is designated together with a Research Supervisor. To maximize the output of Strategic Basic Research Programs, in accordance with the characteristics of each Research Area, extensive management is implemented and organized, including outreach activities, Progress support, fusion of multidisciplinary fields, international collaboration, social implementation or practical development, and human resource development.

---

**In accordance with the characteristics of each Research Area / issue, extensive management is implemented and organized**

- **Outreach activities**
  - Symposia
  - Open seminar for young researchers
  - Joint events with academic conference
  - Press releases
  - Newsletter publications
  - Publication of feature articles in academic journal
  - Joint meeting across multiple Research Areas
  - Networking meetings / study meetings / seminars
  - Supplementary support for integrated researches

- **Progress support**
  - Research Area meetings
  - Site visits
  - Monthly / Quarterly / half-yearly progress report
  - Support for life-events

- **Fusion of multidisciplinary fields**
  - Appointing Industry backgrounded Advisers
  - Evaluation based on technical readiness level (TRL)
  - Patenting support
  - New Technology Presentation Meeting
  - Strengthening cooperation with companies
  - Bridging to various technology transfer funding programs

- **International collaboration**
  - Appointing international Advisers
  - Cooperation with overseas FA
  - Cooperation with JST international collaboration funding program (SICORP)
  - Joint symposium with various overseas organizations
  - Invitation and dispatch of researchers

- **For social implementation -Practical development**
  - Award system
  - Researcher networking events
  - Overseas dispatch training
  - Young researcher camp
  - SciFo8 program
  - Start-up support for PRESTO researchers

---

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Strategic Basic Research Programs
https://www.jst.go.jp/kisoken/en/

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