

## Chapter 6 Deepening the Relationship between STI and Society

In order to respond to social changes and economic/social challenges in the future, we need dialogue and collaboration with diverse stakeholders. To this end, the government, universities, public research institutions, science museums will play central roles in developing co-creation platforms and promoting efforts to ensure the public nature of research.

### Section 1 Promoting Co-creative STI

#### 1 Dialogue and collaboration with stakeholders

Recent policy issues are intricately related to various external and internal factors, and involve many stakeholders. Moreover, circumstances surrounding policy issues and public needs frequently change according to the progress of globalization and other factors. Mindful of these circumstances, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) set up the Office of Interactive Policy-making and provided a permanent space in the ministry to promote dialog with internal and external stakeholders.

Based on the understanding that it is necessary to broaden the range of science and technology diplomatic activities and to ensure opportunities for ongoing dialog among international stakeholders, in 2013 the Japan Science & Technology Agency (JST) implemented the Program for the Promotion of International Policy Dialogs Contributing to the Development of Science and Technology Diplomacy, under the JST initiative for Infrastructure Development for Promoting International Science and Technology Cooperation. This program supports the organizers of international meetings that are held to provide a broad range of stakeholders, who are playing leading roles in globally advancing science and technology in industry, academia and government, with opportunities to discuss the future direction of science and technology.

#### 2 Stakeholder initiatives for co-creation

##### (1) Efforts by public organizations

MEXT, in cooperation with other relevant organizations, including experimental research institutions and local authorities, held the 57th Science and Technology Week from April 18 to 24, 2016. Various events, including opening of research facilities to the general public, experiments in classrooms, lectures, and award ceremony for the winners of science and technology awards given by the Minister of Education, Culture, Sports, Science and Technology, took place at organizations across the country. At the same time, the “Panel Exhibition - Beauty of Science and Technology” introduced to the public beautiful and impressive images produced in the process or as a result of research at the Joho-Hiroba (Lounge of the Exhibition Rooms on the Museum) of MEXT.

The Ministry of Agriculture, Forestry and Fisheries (MAFF) provides producers, consumers and mass media with information and opportunities to exchange opinions on the R&D of advanced technology in agriculture, forestry and fisheries. MAFF also sends researchers to give lectures. The National Research

and Development Agencies under MAFF open their facilities to the public and provide lectures throughout the year, helping to raise awareness by facilitating interactive communication with the public about their research activities and by exhibiting research results.

The Japan Aerospace Exploration Agency (JAXA) provides various educational activities in space science, such as the Cosmic College, and lecturers to schools and seminars.

RIKEN offers various programs to citizens and conducts outreach activities. For example, RIKEN produces animated films geared to high school students in order to explain the latest research results and scientific phenomena. These films are available free online.

The National Institute for Materials Science (NIMS) is active in introducing its research to the public, particularly to young students who might become scientists in the future. For this purpose, NIMS has a video site titled *Material's Eye* that showcases the mysteries of various materials. NIMS is devoting great effort to help people develop an understanding of, and an interest in, science.

The National Institute of Advanced Industrial Science and Technology (AIST) operates the Science Square Tsukuba/Waterfront and the Geological Museum as permanent exhibition facilities. With focus on two-way communication with citizens, AIST opened its research facilities to the public in ten locations nationwide. In FY2016 more than 20,000 people visited the facilities. In addition, AIST actively promotes S&T communication programs focusing on dialogue. This is done through events such as experimental classrooms and the AIST Open Laboratory.

Universities and public research institutions make efforts to widely disseminate information on research results to the general public.

The Council for Science, Technology and Innovation (CSTI) encourages researchers who receive annual public research funds of 30 million yen or more for individual research projects to actively communicate with the public regarding the contents and the results of their research activities.

## (2) Enhancement of activities conducted by science museums

The JST supports S&T communication activities conducted by science museums, social education facilities, research institutions and local authorities, in order to solve issues including social problems and needs through interaction of various stakeholders.

The National Museum of Emerging Science and Innovation promotes interactive communication between researchers and the general public through the creation and lecture of exhibitions to introduce advanced S&T in an easy-to-understand manner, and also through planning and conducting events. It also encourages collaboration among science museums and schools across the country as the hub of Japan's S&T communication activities.

The National Museum of Nature and Science holds exhibitions that provide opportunities to expand people's interest in nature and science across generations, encouraging them to think together, and provides age-appropriate learning support (learning support depending on different backgrounds). Other activities of the museum include: dissemination of model projects to improve the science literacy focused on communication using the exhibitions, spread of learning support activities for effective cooperation between schools and the museum, and a training course for curators of natural science museums.

### (3) Efforts of the Science Council of Japan and academic societies

The Science Council of Japan (SCJ) holds academic forums as part of its activities to feed outcomes of research back to society. In FY 2016, it held six forums on wide-ranging subjects, including “A scientific approach to infants –development of research on early childhood development, education, and policy”, “Are scientists helping in disaster mitigation and formation of a sustainable society?” and “Relationship between security and scholarship: position of the Science Council of Japan”. It also opened a Science Cafe jointly with MEXT four times in FY 2016.

The academic societies are voluntary associations organized mainly by researchers at universities and other research institutions. They play important roles in research evaluation, information exchanges and communication beyond those of individual research organizations, and they contribute to the development of academic research through academic research meetings, seminars and symposiums that disseminate the latest results from quality research and academic journals.

Through programs such as the Grants-in-Aid for Publication of Scientific Research Results, MEXT subsidizes international conferences held by academic societies and symposiums, and other undertakings to strengthen international information dissemination.

### (4) Promotion of risk communication

MEXT is implementing the Promotion Strategy for Risk Communication based on the Program for Developing Risk Communication Models (March 27, 2014, the Committee for Science and Technology for Safety and Security and Social Linkage, the Subdivision on Research Planning and Evaluation, SCT). MEXT newly adopted initiatives of three organizations in FY2016 and is supporting six organizations as of March 2017.

The Consumer Affairs Agency (CAA), the Food Safety Commission, the Ministry of Health, Labour and Welfare (MHLW) and MAFF collaboratively conduct risk communication activities for food safety. The 2003 Basic Food Safety Act (Act No. 48 of 2003) made the government responsible for informing the nation about food safety. Meetings are held for exchanges of opinions on various topics, including the safety of imported food products, pesticide residues, the safety of food additives, the prevention of food poisoning and the safety of functional foods. In particular, since 2011 and in response to the accident at the Tokyo Electric Power Company (TEPCO) Fukushima Daiichi Nuclear Power Station, active risk communication undertakings have been conducted at meetings for exchanges of opinions with consumers regarding countermeasures against radioactive substances.

## 3 Scientific advice for policymaking

With the aim of formulating policies for science, technology and innovation by following a rational, evidence-based process, MEXT has been promoting the Science of science, technology and innovation policy program. In this program, by supporting researchers who pursue science, MEXT promotes STI policies, supports centers (universities) that foster human resources, implements STI policies in society and networks these centers to establish a system that systematically fosters human resources nationwide.

In doing so, MEXT uses the Science, Technology and Innovation Policy Research Center (SciREX center), which was established at the National Graduate Institute for Policy Studies (GRIPS), as the hub. MEXT organizes and networks core centers at the University of Tokyo, Hitotsubashi University, Osaka

University, Kyoto University and Kyushu University in collaboration with these universities. Indicators and evidence-based policies were developed, including those related to the economic and social ripple effects of government investment in R&D.

The National Institute of Science and Technology Policy has established an information base for the collection and accumulation of data that are necessary for the formulation of STI policies and for research, analysis and study on STI. Results of research using the information base are provided to and used by various policy councils of the Cabinet Office and MEXT.

The Research Institute of Science and Technology for Society (RISTEX) of the JST analyzes the following: 1) social issues, and 2) the status of S&T that has the potential to address such issues from various perspectives, including the feasibility of such S&T. Based on evidence of the severity of issues, RISTEX is supporting the public invitation for R&D on methods to formulate policies through rational processes and on performance indicators for such policies. In FY2016 R&D was promoted for 12 projects adopted in FY2013 and after (the 2nd phase started in FY2016.)

Center for Research and Development Strategy (CRDS), the JST grasps and overviews the trends of STI in Japan and abroad as well as related policies, and proposes STI policies and R&D strategies.

#### 4 Ethical, legal, and social initiatives

##### (1) Efforts for development of systems for life science research

###### ① Approaches to bioethical issues

Today's rapidly advancing life science is beneficial to people, but raises ethical questions which may threaten human dignity and rights. The relevant ministries and agencies have formulated the necessary regulations.

For medical research involving human subjects, proper implementation has been planned based on the Ethical Guidelines for Medical and Health Research Involving Human Subjects (Public Notice of MEXT and MHLW, No. 3 of 2014), etc. In response to the requirement of stricter handling of personal information based on the revision of the Act on the Protection of Personal Information (Act No. 57 of 2003) and others, the Guidelines were revised on February 28, 2017 (enforced on May 30, 2017.) For research using human cloning techniques and human embryonic stem (ES) cells, the ministries concerned have taken appropriate measures based on the Act on Regulation of Human Cloning Techniques (Act No. 146 of 2000) and the Guidelines on the Derivation of Human Embryonic Stem Cells (Public Notice of MEXT and MHLW, No. 2 of 2014).

###### ② Securing safety in life science

Recombinant DNA technology can result in new combinations of genes that do not exist in nature. The Act on the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms (Act No. 97 of 2003) provides regulations necessary for ensuring biodiversity.

###### ③ Efforts for the proper implementation of animal trials

The Act on Welfare and Management of Animals (Act No. 105 of 1973) stipulates that animal trials be conducted in accordance with the 3Rs (Replacement, Reduction and Refinement). Based on this act, the Standards Relating to the Care and Management of Laboratory Animals and Relief of Pain (Standards for

Care and Keeping) (Public Notice of the Ministry of the Environment (MOE), No. 88 of 2006) was enacted for animal experiments. Based on these guidelines, MEXT, MHLW and MAFF have implemented similar basic guidelines<sup>1</sup> for research institutes that fall under their jurisdictions, in order to ensure proper care for animal trials.

## (2) Efforts for development of systems for artificial intelligence research

The Ministry of Internal Affairs and Communications (MIC) held the Study Group on AI Networking from February to June of 2016 to summarize concepts and basic principles of the society to be created through AI networking, evaluate the impact and risks of AI networking on society and economy, and sort through issues to be considered. Based on the results, MIC launched the AI Network Society Promotion Council in October of the same year by expansively reorganizing the AI Networking Review Council. The new council is comprehensively examining social, economic, ethical and legal issues toward promotion of AI networking.

## Section 2 Ensuring Research Integrity

Securing of the integrity of research is essential for researchers to build trusting relationships with various stakeholders of society. Researchers and research institutions including universities need to bear it firmly in mind that tirelessly addressing research misconduct is the way to respond to society's trust in STI and increase STI's driving force.

Because of frequently occurring cases of research misconduct, the relevant ministries have revised the existing guidelines in sequence according to the latest actions to strengthen preventive measures against misconduct. MEXT published the Guidelines for Responding to Misconduct in Research (August 26, 2014, decision by the Minister of Education, Culture, Sports, Science and Technology) and has worked to promote research integrity activities, through activities such as conducting Surveys of Implementation Status and providing support for the development of sophisticated RCR (Responsible Conduct of Research) education.

In order to prevent inappropriate use of research funds, based on the Countermeasures against Misconduct in Research Activities by the Competitive Research Fund (September 2005 Agreement in the Liaison Committee of Ministries and Agencies Concerned with Competitive Funding), MEXT and the other relevant ministries have requested that the institutes related to research take necessary actions, including restrictions on new application for competitive funding for those involved in misconduct in research activities. Because of frequently occurring cases of research misconduct, the relevant ministries are sharing information and ensuring liaison and coordination on operation of the guidelines.

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<sup>1</sup> Basic Guideline for Animal Trials at Research Institutes (Public Notice of MEXT, No. 71 of 2006); Basic Guideline for Animal Trials at Research Institutes Under Jurisdiction of MHLW (Public Notice by the Director of Welfare and Science, MHLW, 2006); and Basic Guideline for Animal Trials at Research Institutes Under Jurisdiction of MAFF (Public Notice of by the Secretary-General of Secretariat of Agriculture, Forestry and Fisheries Research Council, MAFF, 2006).