

## Chapter 5 Development and Promotion of Policy in Collaboration with Society

### Section 1 Increase in Relations between Society and STI

#### 1 Promotion of STI Policies from the Public Viewpoint

##### (1) Further involvement of the public in policy planning and promotion

When planning and promoting economically and socially valuable STI policies, the government must thoroughly understand the issues and the social needs that are to be addressed, and to appropriately reflect them in policy. It is also important for the government to disseminate these policies to all levels of the general public and to make efforts to strengthen accountability. Accordingly, the government promotes the implementation of public comment procedures and wide involvement of the public in policy planning and promotion.

##### (2) Response to ethical, legal and social issues

###### ① Securing the integrity of research

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), Ministry of Education, Culture, Sports and Science (MEXT) and the other relevant ministries have requested that the institute related to research take necessary actions, including restrictions on new application for competitive funding for those involved in misconduct in research activities. The guidelines have been revised as required according to cases of misconduct at the time. 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 Guidelines for Responding to Misconduct in Research (August 26, 2014, decision by the Minister of Education, Culture, Sports, Science and Technology) and has continuously worked to promote research integrity activities, including by Conduct Surveys of Implementation Status and providing support for the development of sophisticated RCR (Responsible Conduct of Research) education.

###### ② Efforts in relation to bioethics and safety in life sciences

To adequately deal with problems related to bioethics that could potentially occur as a result of the rapid growth that has occurred in the life sciences recent years, the Council for Science, Technology and Innovation (CSTI) is implementing surveys and studies on important issues. MEXT and the Ministry of Health, Labour and Welfare (MHLW) will also review any necessary acts, regulations and guidelines (See Chapter 2, Section 3, Paragraph 2.)

##### (3) Fostering and securing human resources connecting society with STI policies

###### ① Science and technology communicators

The National Museum of Emerging Science and Innovation, run by the Japan Science and Technology

Agency (JST), is working to foster and produce S&T communicators, who work both inside and outside the museum through S&T communication activities such as conducting dialogues with visitors, as well as planning and producing exhibitions and events.

The National Museum of Nature and Science is also training Science Communicators (See Chapter 5, Section 1, Paragraph 2 (2).)

#### ② Human resources for research management (research administrators)

In addition, MEXT has been encouraging the development and employment of research administrators to improve research environments towards providing for more active research and strengthening R&D management at universities.

#### (4) Efforts to solve specific problems in society

Optimally exploiting knowledge on both natural sciences and humanities and social sciences, the Research Institute of Science and Technology for Society (RISTEX) of the JST promotes problem-solving R&D to feed new R&D outcomes useful for resolving problems back to society in collaboration with stakeholders in various positions and familiar with situations and issues in specific places. RISTEX also supports efforts to utilize and develop the outcomes of R&D projects implemented by public R&D funds through the Implementation-Support Program.

## 2 Promotion of S&T Communications

### (1) Science and technology week

MEXT, in cooperation with other relevant organizations, including experimental research institutions and local authorities, held the 56th Science and Technology Week from April 13 to 19, 2015. 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, Science Café, where researchers and citizens could talk casually over a cup of coffee was held at the Joho-Hiroba (Information Plaza) of MEXT.

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

The JST supports experimental and interactive events and the establishment of networks by science museums, universities, local authorities and volunteer groups, to promote S&T communication activities nationwide for solving issues including social problems and needs.

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 background). The

museum organizes the Science Communicator Training Program and the Museum Open House for Teachers, which provide scientific experimental study programs developed for schools across the country. Through the programs, the museum improves the science literacy of every generation.

### (3) Efforts by research agencies

The Japan Aerospace Exploration Agency (JAXA) provides various educational activities in space science, such as the Cosmic College, and providing 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<sup>1</sup>.

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 Ministry of Agriculture, Forestry and Fisheries (MAFF) provides producers and consumers with information and opportunities to exchange opinions on the R&D of advanced technology in agriculture, forestry and fisheries. The research and development (R&D) institutes 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 National Institute of Advanced Industrial Science and Technology (AIST) operates the Science Square Tsukuba/Waterfront and the Geological Museum as permanent exhibition facilities. In 2015, its research facilities were opened to the public in ten locations nationwide. More than 15,000 people visited the facilities. In addition, with the aim of establishing interactive communication with the public, AIST actively promotes S&T communication programs focusing on dialogue. This is done through events such as Science Cafés, 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.

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.

(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 2015, it held eight forums on wide-ranging subjects, including the Japanese Gender Equality Strategy in Academic, Science and Technology Fields - In relation to the *Fourth Basic Plan for Gender Equality*, University Reform in an Age of Fewer Youths and Internationalization, the Establishment of Academic Collaborations for Disaster Mitigation and Handing Down of the Experience to Respond the Great East Japan Earthquake. It also opened a Science Cafe jointly with MEXT six times in FY 2015.

<sup>1</sup> <http://www.riken.jp/pr/videos/>

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.

(Promotion of risk communication)

MEXT launched the Program for Developing Risk Communication Models based on the Promotion Strategy for Risk Communication (March 27, 2014, the Committee for Science and Technology for Safety and Security and Social Linkage). MEXT supported three organizations as of FY 2015.

Using the three projects of MEXT under the Program for Developing Risk Communication Models as case studies, the JST jointly held a workshop with MEXT and The Society for Risk Analysis Japan and discussed the assessment criteria and modeling of risk communication.

The Consumer Affairs Agency (CAA), the Food Safety Commission, 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.

## Section 2 Promotion of Effective STI Policies

### 1 Strengthening of Policy Planning and Promotion Function

#### (1) Undertakings for reinforcing headquarter functions of CSTP

To expand the scope of affairs under the jurisdiction of the former Council for Science and Technology Policy (CSTP) and the Cabinet Office, the government submitted to the 186th Diet a draft of the Act for the Partial Revision of the Act for the Establishment of the Cabinet Office. The act was passed on April 23, 2014 and enacted on May 19, 2014 (See Chapter 1, Section 2).

#### (2) Integrated promotion of social system reforms and R&D

The projects continued across fiscal years by the Strategic Funds for the Promotion of Science and Technology according to the policies determined by CSTI (former CSTP) were implemented as programs in the integrated promotion of social system reform and R&D by MEXT from FY 2013 and three programs were implemented in FY 2015.

### **(3) Science for RE-designing Science, Technology and Innovation Policy (SciREX) program**

With the aim of formulating policies for science, technology and innovation by following a rational, evidence-based process, MEXT has been promoting the Science for RE-designing Science, Technology and Innovation Policy (SciREX) program. On the basis of the interim assessment of the SciREX program conducted in FY 2015, the SciREX advisory committee was organized in January 2016 to promote the SciREX program in an integrated manner. The advisory committee has been offering advice on basic work procedures, as well as on projects related to SciREX.

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 conducted research and analyses based on administrative needs, and 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.

In addition, 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 of R&D on methods to formulate policies through rational processes and on performance indicators for such policies. In FY 2015, R&D was promoted for 19 projects that were selected from FY 2012 to 2014.

### **(4) Interactive policy-making**

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, 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.

## **2 Enhancement of Assessment and Allocation Functions in the Research-Fund Systems**

### **(1) System reform for the effective and efficient assessment and allocation of research funds**

According to the Basic Policy<sup>1</sup>, which states “the competitive fund systems that have a similar purpose or

<sup>1</sup> Report on the Consultation No. 11 “Regarding Basic Policy for Science and Technology” that was provided to CSTP (Dec. 24, 2010)

subject of R&D will be consolidated within or across government ministries and agencies,” MEXT promotes efficient R&D by consolidating all fund systems into five systems, including the Grants-in-Aid for Scientific Research (KAKENHI).

In order for research funds to be utilized effectively and efficiently, the Unification of Rules for Using Competitive Funds (March 31, 2015, Agreement by the Relevant Ministries and Agencies That Provide Competitive Funds) was formulated in accordance with the 2011 Action Plans (July 8, 2010), and efforts to unify, streamline and rationalize rules for the use of competitive funds have been made by all relevant ministries, agencies and fund-distribution organizations.

## **(2) Improvement and enhancement of the competitive fund system**

The competitive fund system is a core research-fund system for the establishment of a competitive research environment and for the consistent development of, and ongoing commitment to, researchers in various creative R&D activities. Efforts have been made to reserve budgets and improve the system (421, 3 billion yen for FY 2015 budget, Table 2-5-1). Indirect costs, a feature of the competitive fund system, are allocated as a proportion of research funds to the institution to which the researcher granted competitive funds intended to promote competition among research institutions.

Regarding R&D management work, including the issuance of invitations to the public and the application of competitive funds, the Cross-ministerial R&D Management System (e-Rad<sup>1</sup>) is used. The current system allows users to display information entered into a public database with e-Rad and to modify it to create a summary document of each researcher’s career and achievements, which improves the efficiency of users’ applications and the management of their work in regard to requests for research funds.

In order to ensure the fair, transparent and high-quality examination and evaluation of research proposals, the government ensures diversity in the age, gender and affiliation of examiners. It also aims to eliminate stakeholders, to develop an examiner-evaluation system, to specify methods and criteria for examination and adoption and to disclose examination results.

For example, the examination of KAKENHI applications is conducted via a process of peer review by more than 6,000 examiners. The JSPS selects examiners from the examiner candidate database (about 81,000 researchers as of FY 2015) by taking into account the balance among research institutions and the aggressive promotion of young and female researchers. The disclosure of examination results has also improved every year. In addition to numerical information, such as a rough ranking of all unsuccessful research application and the average score of each evaluation element, detailed items in each evaluation element that examiners have judged as being inadequate are disclosed through the Electronic Application System for KAKENHI to give the applicants a more detailed evaluation of the results.

Concerning measures to prevent the inappropriate use of competitive funds and other public research funds, the Measures to Prevent the Inappropriate Use of Research Funds (August 31, 2006) and the Guidelines for Management and Audit of Public Research Funds at Research Institutions (implementation standards) (February 15, 2007) (hereinafter: Guidelines) has been formulated.

Because the abuse of research funds has become a significant social issue, the ministries concerned have

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<sup>1</sup> The “E” of electronic is added to Rad, an abbreviation for research and development.

revised guidelines to prevent any unauthorized use of allocated funds. MEXT also revised its guidelines in February 2014 to clarify the responsibilities of organizations and prevent misconduct. Efforts to prevent the abuse of public research funds include the following: conducting thorough surveys and monitoring of the management and auditing of public research funds at research institutions, and urging research institutions to secure an adequate system for their management and auditing of public research funds by taking measures, if necessary, for improvement and follow-up.

### **(3) Reform of competitive research funds for supporting the continuous production of research results**

Based on the interim report Reform of competitive research funding for supporting continuous production of research results submitted by the Investigative Commission on Reform of Competitive Research funding on June 24, 2015, MEXT decided to allocate indirect expenses equivalent to 30% of the direct expenses to each research project that is newly qualified to receive competitive research funds. The investigative commission, led by Michinari Hamaguchi, president of the JST, has been examining the direction of reform of competitive research funding that supports the continuous production of research results. Government ministries are investigating reforms for research funding other than competitive funding in view of the progress of university reform. The reform of research funding under consideration includes the addition of indirect expenses to research funds, measures for encouraging universities to disclose their policies for research fund use and to record the use of research funds, and the improvement of the usability of research funds.

■ Table 2-5-1 / List of competitive funds

Ministry	Implemented by	Program	Description	FY 2014 Budget (Mill. yen)	FY 2015 Budget (Mill. yen)
Cabinet Office	Food Safety Commission	Research Program for Risk Assessment Study on Food Safety	Conducting research to determine guidelines and standards on risk assessments through a “research-area setting type” competitive fund system, which sets out research areas and publicly invites researchers to promote scientific food safety (risk) assessments.	194	194
Subtotal (Cabinet Office):				194	194
MIC	MIC	Strategic Information and Communications R&D Promotion Programme (SCOPE)	Inviting proposals publicly about unique and novel research subjects in the field of information and communications technologies (ITC) widely from research institutions at universities, incorporated administrative agencies, companies and local governments: Research is contracted out to institutions that are selected by external experts, whereby the following are promoted: 1) the fostering of young ICT researchers, 2) regional revitalization through ICT and 3) the international certification of communications technologies	2,548	2,419
	MIC	ICT innovation (the “I-Challenge!” program)	Promoting comprehensive support in order to develop businesses by using commercialization know-how, such as that possessed by venture capitalists, and by using R&D possessed by SMEs and universities, for the practical application of R&D results in ICT fields and for the creation of new businesses	500	370
	MIC	R&D of Technologies for Resolving the Digital Divide	Enhancing communications and broadcasting services for the elderly and disabled by offering political support for R&D to benefit these groups.	47	41
	Fire and Disaster Management Agency (FDMA)	Promotion Program for Fire- and Disaster-Prevention Technologies	A program established in FY 2003 to develop fire- and disaster-prevention technologies into innovative and practical technologies and to widely invite enabling research and development in industry, academia and government, including universities, private companies, research corporations and Fire-Defense Headquarters	153	138
Subtotal (MIC):				3,248	2,968

MEXT	MEXT JSPS	Grants-in-Aid for Scientific Research (KAKENHI)	Targeting the rapid advancement of scientific research according to researchers' own ideas in all scientific fields from the humanities and the social sciences to the natural sciences and funding creative and pioneering research selected by peer review (decided by multiple researchers with the same or similar specialties), supporting the foundation of an affluent society through	227,616  (Grants allocated to researchers 230,451 230,451 (*1))	227,289  (Grants allocated to researchers 230,451 231,790 (*1))
	JST Japan Agency for Medical Research and Development (AMED)	Strategic Basic Research Programs	Forming time-limited consortia beyond institutional boundaries (virtual network institutions) to promote R&D for creating new technologies useful for solving critical issues in Japan under policies determined by a top-down approach based on social and economic needs.	61,241	61,115
	JST AMED	Industry- Academia Collaborative R&D Programs	Promoting R&D using intellectual property by specific university (researcher) and specific company and R&D using a platform that supports multiple universities (researchers) and industry to promote the practical application of research outcomes at universities through industrial-academia collaboration and create innovation.	27,079	29,807
	JST AMED	International Collaborative Research Program	Promoting international collaborative research with developing countries to address global challenges in environmental and energy fields, disaster-prevention, infectious disease control and bioresources via excellent S&T and ODA in Japan and strategically promoting collaborative research on most advanced technologies with Europe and emerging Asian countries under equal (50/50) partnerships based on intergovernmental agreements.	3,319	3,408
	MEXT JST AMED	R&D Promotion for National Issues	Setting detailed R&D themes for the challenges faced by Japan and selecting outstanding proposals based on the potential achievement of technological targets.	28,755	23,138
Subtotal (MEXT):				348,010	344,757
MHLW	MHLW	Health and Labour Sciences Research Grants	Improving the technological level of health and medical services, welfare, environmental health, and workplace health and safety by fostering a competitive research environment for pioneering research, other original research and solutions eagerly sought by society; promoting research on health, labor and science, in order to ensure the scientific promotion of administrative policies	38,565	7,183
	National Institute of Biomedical Innovation	Grants to promote the Development of Orphan Drugs and Orphan Medical Devices (3*)	Supporting pioneering research R&D in fields with high risks or where it is difficult for companies to conduct proactive R&D, such as on difficult-to-treat or rare diseases, and using innovative techniques or approaches and disseminating the results.	2,847	-
	AMED	Grant Programs of AMED	Enhancing translational R&D and practical application of R&D results in medicine, plus	-	44,469

			R&D for creating research environments that ensure efficient and effective R&D in medicine.		
Subtotal (MHLW):				41,412	51,652
MAFF	MAFF	Promotion of research on S&T for agriculture, forestry, fisheries and the food industry	<p>To foster innovation that promotes the growth of the agriculture, forestry, fishery and food industries, there is the need for a system that ensures the practical use, at production sites, of basic research results that are achieved by public research institutions. Such practical use is done in collaboration with private companies so that the investment benefits producers in the agriculture, forestry and fisheries industries and benefits society.</p> <p>This program aims to integrate domestic research capabilities and to activate exchanges of human resources by optimally exploiting Japan's high R&amp;D capabilities in the agriculture, fishery, forestry and food industries, by enlisting the interdisciplinary research capabilities of private companies and by supporting industry-academia collaborative research to solve technological issues and improve industrial competitiveness.</p> <p>Under this program, seamless support is provided for each stage of R&amp;D, as "seeds creation stage" for basic R&amp;D, "development fusion stage" for application R&amp;D and "practical technology development stage" for practical application R&amp;D and research topic proposals are publicly invited.</p>	5,217	5,238
Subtotal (MAFF):				5,217	5,238
	METI	Promotion Program for Collaborative Business Creation by Manufacturing (Monozukuri) SMEs and Small Entrepreneurs	Supporting R&D and prototyping leading to the improvement of 11 technologies, including precision work and 3D modeling pursuant to the Basic Act for Buildup of Fundamental Monozukuri Technologies advancing fundamental monozukuri technologies of SMEs	6,334	-
METI	METI	Program for the Collaborative Creation of Innovative Manufacturing (Monozukuri) Businesses	Supporting R&D and prototyping leading to the improvement of 12 technologies, including precision work and 3D modeling pursuant to the Basic Act for Buildup of Fundamental Monozukuri Technologies advancing fundamental monozukuri technologies of SMEs.	-	10,272
	New Energy and Industrial Technology Development Organization (NEDO)	Program for Advanced Industrial Technology Creation (Grants for Young Researchers)	Granting funds for outstanding research themes selected from applications from young (individual or team) researchers at universities, inter-university research institutes, national research institutes, colleges of technology, incorporated administrative corporations, public experimental research institutions, foundations and incorporated associations; (universities and research institutes) through public invitations to enhance industrial technology in specified	638	187

			technological fields and themes that industry expects the universities and research institutes to address.		
Subtotal (METI):				6,972	10,459
MLIT	MLIT	Construction Technology Research and Development Subsidy Program	Granting funds for R&D of technologies helping refine and enhance the international competitiveness of construction technologies under MLIT's jurisdiction to promote technological innovation in the construction field. There are two types of public invitation: The invitation for research proposals has two categories: the Public Invitation for Technology Development that Addresses Policy Issues (general topics; SMEs), and the Public Invitation for Technology Development that Addresses Issues Associated with Earthquake Disasters. MLIT provides grants for research on R&D themes appropriate for each category.	257	253
	MLIT	Program to Promote the Technological Development of Transportation	Research institutions are invited, through open annual invitation, to propose research topics related to policy issues of MLIT. Prospective topics are selected from these proposals, and the chosen institutions are commissioned to conduct the research under R&D projects.	159	180
Subtotal (MLIT):				416	433
Ministry of the Environment (MOE)	MOE	Environment Research and Technology Development Fund	Promoting scientific knowledge accumulation and technological development essential for implementing environmental policies to realize a sustainable society by preventing global warming, forming a recycling society, coexisting with the natural environment and managing environmental risk	5,510	5,300
Subtotal (MOE):				5,510	5,300
Ministry of Defense (MOD)	MOD	Innovative Science & Technology Initiative for Security	Finding ingenious and promising research which is conducted at universities, national research institutions or private companies and may produce results applicable to defense equipment, for the purpose of commissioning these universities, national research institutions or private companies to conduct research on outstanding research topics that they propose.	-	260
Subtotal (MOD):				-	260
Total				410,979	421,261

Note: Subtotals and totals may not match due to rounding.

1\*: A multi-year funding system has been in place for some grant categories since FY 2011. Therefore, the budget for a given year is not always the same as the amount of funds granted. The figure for "funds" in the budget includes the money to be budgeted for the following fiscal years. Therefore, both budgets and funds granted are specified.

2\*: The budget is the amount for the continued basic research promotion program for elderly healthcare medical fields in Grants to Promote the Development of Orphan Drugs and Orphan Medical Devices.

Source: Adapted by MEXT based on data provided by the Cabinet Office

### **3 Enhancement of R&D Implementation Systems**

#### **(1) Reform of R&D institutes**

Based on the Revised Act on Enhancement of Research and Development Capacity and the Basic Policy on Reform of Independent Administrative Agencies (decided by the Cabinet on December 24, 2013), the Revised Act on General Rules of Independent Administrative Agency (Act No. 66, 2014) defined R&D-based independent administrative agencies as national R&D institutes, and 31 were launched in FY 2015. National R&D institutes aim to maximize R&D outcomes that contribute to the sound development of the national economy and other public interest through mid- to long-term S&T improvement. According to this institutional reform, the Comprehensive Strategy on Science, Technology, and Innovation 2015 focuses on the following efforts: operational improvements through the flexible procurement of goods and services necessary for R&D; the development and shared use of advanced research infrastructure; the utilization of a cross-appointment system for enhancing the mobility of human resources; the functional enhancement of translational research; the diversification of research funding sources; and the creation of strategic management systems.

The 5th Science and Technology Basic Plan explicitly states the following: From the viewpoint of national strategies, national R&D institutes should fulfill their roles and missions and should maximize their research results in close cooperation with the national government. Thus, the government encourages national R&D institutes to ensure appropriate, effective and efficient administration and management by setting and assessing mid- to long-term goals in light of the characteristics and diversity of R&D activities at these institutes as well as by securing necessary budgets. The government also creates opportunities for the dissemination of information on, and the visualization of, the roles and mid- to long-term goals of these institutes at home and overseas.

The government also determined to define national R&D institutes dealing with creative projects to produce world-class outcomes as Specific National R&D Institutes by law according to the Basic Guidelines for Reform of Independent Administrative Agencies and supervised under closely relation of CSTI and the minister concerned and special management measures. In addition, the Act on Special Measures regarding the Promotion of Research and Development by Specific National R&D Institutes is planned to be submitted at the 190th ordinary Diet session and to be implemented in October 2016. On the basis of the report titled *the Concept on Designated National R&D Institutes (provisional)* (revised and decided by CSTI in December, 2015), RIKEN, AIST and NIMS were selected as the Designated National R&D Institutes that were to be governed by the aforesaid act. This Act stipulates that Designated National R&D Institutes and their qualification shall be reviewed, at the right time after the Act taken effects, in view of institutional aspects and results of the enforcement of the Act and that necessary measures should be taken accordingly.

#### **(2) Development of a system for effectively promoting research activities**

In order for universities and public research institutions to promote research activities effectively and efficiently, it is necessary to develop a system that enables of various personnel specialized in the management of overall research activities, in the management and operation of intellectual property and in the maintenance and management of facilities and equipment to be active, as well as researchers. However, individual research institutions cannot secure these specialized personnel, and most researchers

do not have enough time beyond their own research for managerial work. In response, the government will strengthen efforts to improve these conditions.

Considering this situation, MEXT supports the fostering and securing of human resources that are capable of managing research (research administrators) at universities and other institutions (URAs) (See Chapter 5, Section 1, Paragraph 1(3).)

In order to create internationally competitive industries, the Japan Patent Office, through the National Center for Industrial Property Information and Training, has dispatched intellectual property management experts, called intellectual property producers (IPPs), to universities and R&D consortiums, where public funds are allocated in expectation of innovative output.

In order to assist in the formulation of research plans that are to be implemented in collaboration with universities, incorporated administrative agencies and public research institutions, MAFF offers support for the deployment of coordinators throughout the country who are specialized in the agriculture, forestry, fisheries and food industries. This support includes the introduction of viewpoints on the management of technology (MOT), including the strategic use of intellectual property.

## **4 Establishment of the PDCA Cycle in Science, Technology and Innovation Policy**

### **(1) Ensuring the effectiveness of the PDCA cycle**

To promote STI policies effectively and efficiently, it is necessary to set clear performance targets, such as policies, measures and implementation systems. It is also necessary to conduct timely follow-ups to ensure progress, and to consider the results when reviewing policies and resource allocation. Finally, it is necessary to plan new policies by establishing PDCA (Plan-Do-Check-Action) cycles. For this reason, the government has been promoting efforts to ensure the effectiveness of PDCA cycles. Specifically, the government has established the National Guideline on the Method of Evaluation for Governmental R&D ((National Guidelines) instituted by the Prime Minister in FY 2012 (See Chapter 5, Section 4, Paragraph 4(2).)

### **(2) Improvement and enhancement of R&D evaluation systems**

In addition to the revision of the National Guidelines, MEXT revised the Guidelines for Evaluation of R&D in MEXT (Decided by the Minister of MEXT) (hereinafter: MEXT R&D Evaluation Guidelines) in April 2014. The revision positions five items as special issues: 1) creating science- and technology-based innovations and promoting a problem-solving system, 2) promoting high-risk research and inter-, multi- and trans-disciplinary research, 3) promoting education and support for junior researchers who will lead the coming generation, 4) preventing evaluations from becoming mere formalities, and alleviating the growing burden of evaluation and 5) evaluating R&D programs.

Based on the National Guidelines and the MEXT R&D Evaluation Guidelines, MEXT has been conducting evaluations in accordance with the objectives, policies and scale of each research project. This is based on a wide range of R&D that covers everything from scientific research stemming from researcher's free thinking and personal motivation in R&D, to large projects that realize a specific policy objective. To establish priorities, the appropriateness of budget requests is judged by conducting an

assessment by means of an external evaluation. An interim evaluation is then conducted to confirm the need for changes to the plan, and an ex-post evaluation is conducted for application to the next deployment. Since much basic research leads to unexpected developments over time, care is taken to avoid evaluations that expect a rapid output based on uniform and short-term points of view.

METI conducts ex-ante evaluations, interim evaluations, post evaluations and follow-up evaluations of R&D projects. To set themes and funding systems for R&D programs and to properly evaluate these programs, METI revised its Technical Guidance on Evaluation according to national guidelines that had been revised in December 2012. Based on those national guidelines, METI revised the standard evaluation items and evaluation criteria in April 2015. Incorporated administrative agencies and national universities are evaluated pursuant to the Act on General Rules for Incorporated Administrative Agency and Act on National University Corporation, (Act No. 112 of 2003). The national research and development agency is evaluated by the competent minister pursuant to the Guidelines for Incorporated Administrative Agency Evaluation, mainly with the aim of maximizing R&D outcomes (See Chapter 5, Section 2, Paragraph 3(1).)

### Section 3 Expansion of Research and Development Investment

The government set an elevated target for R&D investment of at least 4% of GDP for the public and private sectors by FY 2020. The 4th Basic Plan states “comprehensively, considering that the percentage of the Japanese government’s burden of research costs is lower than that of foreign countries, considering that the government’s investments are expected to produce the synergistic effect of promoting private-sector investment, which is currently hampered by a weak economy, and considering that many foreign countries are increasing S&T investment by setting targets, an expansion of investment is required” (Figure 2-5-2). Although the government aimed at investing about 25 trillion yen in R&D during the period of the 4th Science and Technology Basic Plan, the target was not achieved. The government invested only 22.9 trillion yen in R&D.

The 5th Science and Technology Basic Plan states as follows: With a view to continuing the efforts to promote science and technology, the quality of S&T policies needs to be continuously enhanced. It is necessary to set specific goals for increased government investment in R&D from a comprehensive perspective by taking into consideration various factors, including the following: the fact that many other countries are increasing their government investment in R&D, government funding as a share of all R&D funds in Japan and the need for increased government R&D investment to produce the synergistic effect of promoting private sector investment. Accordingly, the government aims for an increase in R&D investment by the public and private sectors to at least 4% of Japan’s GDP. Additionally, the government has set the goal of investing 1% of GDP in R&D. This goal is to be achieved while securing consistency with the economic and financial revitalization plan stated in the Basic Policy on Economic and Fiscal Management and Reform 2015 (Cabinet decision, June 2015). On the assumption that the nominal GDP growth rate during the period of the 5th Basic Plan is 3.3% on average, the total amount of government investment in R&D during the same period is estimated at 26 trillion yen.

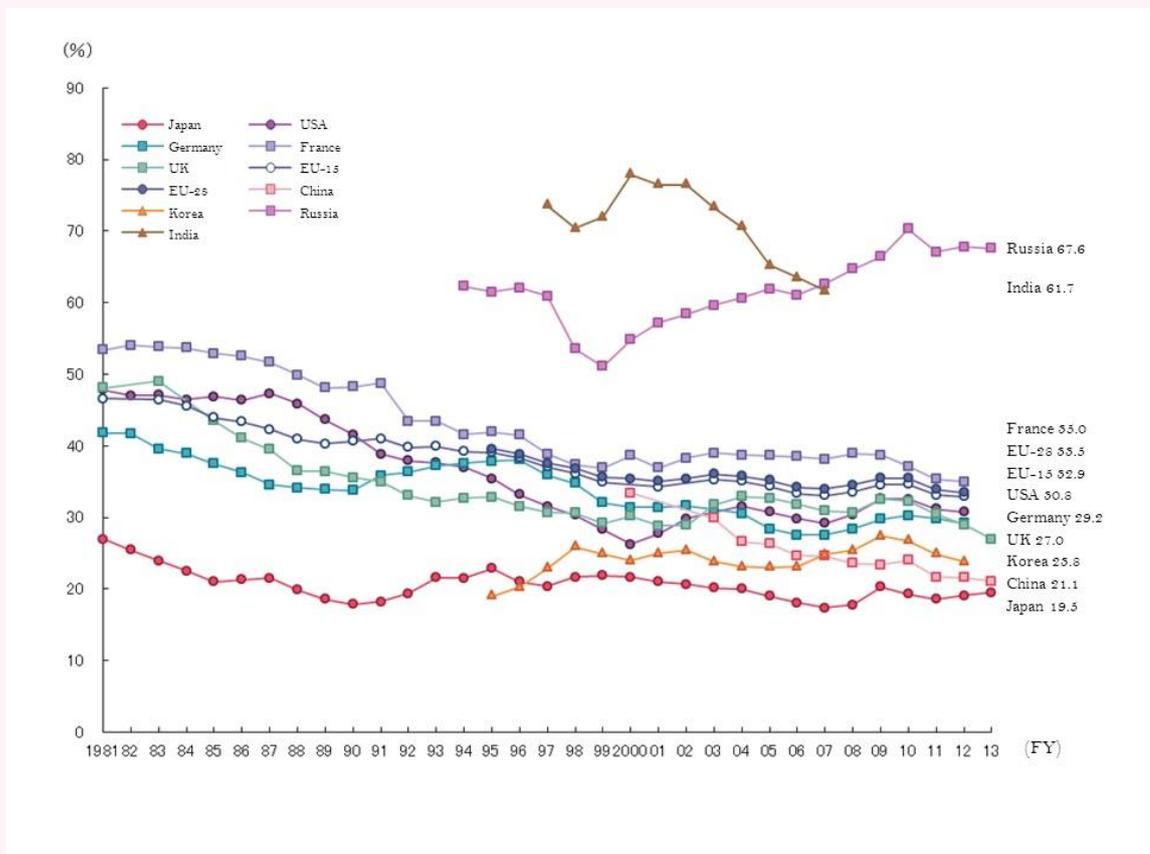
(Government R&D investment)

Government R&D investment in FY 2015 was 4.1257 trillion yen. The breakdown was 3.6364 trillion yen from the central government, including both the initial budget and the supplementary budget, and 489.3 billion yen from local authorities. (For details on R&D investment by the central government (See Chapter 1, Section 4, Paragraph 2.)

(Preferential treatment to promote R&D investment by the private sector)

To promote R&D in the private sector, various tax measures are provided, as shown in Table 2-5-3.

■ Figure 2-5-2 / Trends in Government-financed R&D Costs in Major Countries



Note: Defense-related research costs are included.

Source: Adapted by MEXT based on *the Report on the Survey of Research and Development* (the Statistics Bureau) and *the Main Science and Technology Indicators* (OECD.)

■ Table 2-5-3 / R&D taxation system

Purpose	Description	Applicable law
Promotion of R&D investment by the private sector	<p>Proportional Tax Credits for R&amp;D costs*</p> <p>I Proportional Tax Credits for total R&amp;D costs                      -The R&amp;D credit is a percentage (8 to 10%) of total R&amp;D costs. (The maximum is 25% of the corporate tax liability.)</p> <p>II Tax system to strengthen the technical base of SMEs (applied instead of I)                      -The tax credit is equivalent to 12% of the research and testing costs of SMEs (but limited to 25% of the corporate tax)*.</p> <p>III Special Tax Credit on special R&amp;D costs*                      -For collaborative research with universities, public R&amp;D institutes, independent administrative experimental research institutions and the like, and for research commissioned to these universities, institutes, institutions and the like, the tax credit is determined by multiplying the R&amp;D cost by 30% or 20%*. (The R&amp;D costs used for calculating the amount of tax credit in I or II above are excluded.) The tax credit according to III, which is given separately from the tax credit according to I or II above, is up to 5% of the corporation tax.                      -*30% is applied to the R&amp;D costs for collaborative research with, or research commissioned to, universities, public R&amp;D institutes or independent administrative experimental research institutions. 20% is applied to collaborative research with, or research commissioned to, others.</p> <p>IV. IV. Special Tax Credits for increased R&amp;D costs*                      -Either of the following ① or ② will be selected and will be applied (limited to an amount equivalent to 10% of the corporate tax, apart from I through III)</p> <p>① When the R&amp;D costs exceed 105% of the average (comparison R&amp;D costs) of the R&amp;D costs for each term in the 3 years prior to the current term and exceed the peak R&amp;D costs in each term in the 2 years prior to the current term, a tax equivalent to the amount left by subtracting comparative R&amp;D costs from R&amp;D costs and multiplied by the incremental R&amp;D costs (up to 30%) is exempted.</p> <p>② When the R&amp;D costs exceed 10% of sales for the current term and each term in the 3 years prior to the current term, a certain proportion of the excess is exempted.</p> <p>(Remarks)                      *Extended for 3 years to FY 2016. Enacted in FY 2008</p> <p>(2) The tax credit in (1) above is excluded from the tax base for corporate inhabitants' tax (local tax). Enacted in FY 1985</p>	Act on Special Measures Concerning Taxation: Article 10 (Income Tax); Article 42-4; Article 68-9 (Corporation Tax) Supplementary Provisions of the Local Tax Act: Article 8-1

Source: MEXT