



Section 2 Development of Science and Persistent Innovation

The term “innovation” is not a narrow-defined concept of simple “technological innovation,” but it implies extensive creation of new values, including social systems, thereby bringing substantial changes at all social levels. The “innovation nation,” at which Japan is aiming, is the society in which the capacity of each individual person can be fully exerted, the society full of vitality, and the society in which we can actually feel richness.

The Cabinet Office determined that social system reform and technical innovation, which establish the social environment toward creation and promotion of innovation, will be promoted in an integrated and continuous manner based on the 3rd Basic Plan. More specifically, steady approaches on measures for creation of innovation will be promoted through the (1) Pioneering Projects for Accelerating Social Return; (2) follow-up of progress status of the system reform; and (3) understanding of domestic and overseas movements related to innovation and other projects.

MEXT is promoting “World Premier International Research Center Initiative (WPI)” and other projects to develop “visible research centers,” which are to be promoted with their excellent research environment and superior level of research.

METI promotes the “Innovation Superhighway Plan” to build a scheme to promptly connect the R&D outcomes with commercialization.

1 Developing a Competitive Environment

(1) Enriching competitive funds and indirect costs

The budget for competitive funds, which help to create a competitive R&D environment, was 463.1 billion yen in the FY 2010 budget (491.2 billion yen under the FY 2009 budget). In addition, the “Leading-edge Research Promotion Fund,” the “Funding Program for the World-Leading Innovative R&D on Science and Technology” (100 billion yen) and the “Funding Program for Next-Generation World-Leading Researchers” (50 billion yen) have been dedicated as implementation projects until FY 2013. By allocating a fixed percentage of research expenses as indirect costs to institutions employing researchers who received competitive funds, competition among research organizations employing researchers has been promoted. In FY 2010, 40 of the 41 competitive funds applied the allocation at a rate of 30% of research expenses. (This includes funds allocated in some cases.)

Table 2-3-3 shows competitive funds sponsored by government ministries and agencies.

Table 2-3-3/ List of Competitive Funds

Ministry	Sponsor	Program	Program outline	FY 2009 budget (Unit: million yen)	FY 2010 budget (Unit: million yen)
CAO	CAO	Grants-in Aid for the Food Safety Risk Assessment	To promote research related to setting forth guidelines and evaluation standards related to risk evaluation in order to promote a science-based evaluation of the effects of food on health (risk evaluation).	323	343
Cabinet Office, Government of Japan Subtotal				323	343
MIC	MIC	Strategic Information and Communications R&D Promotion Program (SCOPE)	To actively promote unique and novel R&D projects in line with strategic priority targets in order to enhance R&D capabilities regarding information and communications technologies, improve researcher quality through the establishment of a competitive research environment and create	2,179	1,787

			intellectual property meeting international standards of excellence.		
MIC	MIC	Promotion program for Reducing global Environmental load through ICT innovation	To promote R&D from ICT seeds to create ICT innovation realizing significant reduction in CO ₂ emission. Excellent projects are selected by public submission or through competitive selection by an external evaluation committee, and the R&D is implemented intensively during the period of the Kyoto Protocol.	390	566
MIC	National Institute of Information and Communications Technology	Financial aid for promotion of advanced technology development in telecommunications and broadcasting	To create new businesses in the communications and broadcasting sectors by supporting private-sector companies, conducting R&D of telecommunications and broadcasting services to contribute to enhancement of convenience for challenged and elderly, and international research team consisting of researchers worldwide, including venture companies, that are engaged in R&D activities related to advanced ICT.	300	210
MIC	National Institute of Information and Communications Technology	Program for Promotion of Private-Sector key Technology Research	To invite proposals for experimental and research themes related to communications and broadcasting technologies from the private sector and entrust private-sector companies with experiments and research concerning selected themes in order to promote investigational efforts that will help strengthen the foundation of the national economy and people's lives.	2,600	1,400
MIC	Fire and Disaster Management Agency	Promotion Program for Fire and Disaster Prevention Technologies	In order to promote science and technology related to prevention/mitigation of fires and other disasters to yield a safe and comfortable society, research is conducted on actual disaster prevention/mitigation activities while pursuing relevant technologies and promoting industry-academia-government coordination and research activities by local governments.	279	254
Ministry of Internal Affairs and Communications Subtotal				5,749	4,217
MEXT	MEXT/JSPS	Grants-in-Aid for Scientific Research	The Grants-in-Aid for Scientific Research aims to dramatically advance academic research (based on the free thinking of researchers) across all fields including the humanities and social sciences as well as the natural sciences, from basic through applied research. The program supports creative and pioneering research that will support the foundation of a rich society.	196,998	200,000
MEXT	JST	Basic Research Programs (incl. social technology research and development projects)	To promote basic research on "strategically prioritized S&T" topics in line with the "strategic sector" set by the government, supporting social and economic needs, to further advance S&T and create new technologies leading to the creation of new industries.	51,640	52,519
MEXT	MEXT	Special Coordination Fund for Promoting Science and Technology	A competitive, policy-guided fund which is operated by MEXT in line with CSTP. Toward the full-scale execution of the Third Basic Science and Technology Plan, public participation related to science and technology system reform will be invited for agile and strategic utilization.	36,340	29,643
MEXT	MEXT	Promotion of Graduate School Education Reform Project (Global COE Program of the project)	To selectively support formation of excellent world-class education and research centers, while accomplishing the basic concept of the "21st Century COE Program," which aims to foster young researchers and create international centers.	34,228	26,474
MEXT	MEXT	World Premier International Research Center Initiative (WPI)	To establish "visible centers" which boast excellent research environments and an elevated research level to attract front-line researchers from all over the world by strongly supporting initiatives boosting formation of research centers with a core of high-level researchers and by prompting the introduction of system reform.	7,109	7,283
MEXT	MEXT	Promotion of R&D for Key Technologies	To promote 1) R&D in life sciences based on social needs, 2) R&D related to the establishment of the next-generation IT infrastructure, 3) Promotion of Novel Interdisciplinary Fields Based on Nanotechnology and Materials in order to advance R&D on key technologies facilitating activities for securing Japan's safety, security, and economic development.	21,477	18,349
MEXT	MEXT	Japan EOS Promotion Program	To conduct technology development and observational research in fields where Japan should play the leading role, based on proposals selected from public submissions, with a view to the establishment of a global observation system advocated by the Earth Observation Summit.	354	35
MEXT	MEXT	Innovative Nuclear Research and Development Program	To implement, amid a competitive environment, R&D related to nuclear reactor and fuel cycle technologies targeted for promotion by the government, plus related basic research, with a view to realizing an innovative nuclear system.	5,769	4,144
MEXT	MEXT	Program for Promotion of Humanities and Social Sciences to Satisfy Policy and Social Demands -Program for promoting social science research aimed at solutions of near-future problems-	To implement solution-oriented research by assembling researchers from various fields, especially the social sciences, and by applying empirical research methods to problems that Japan will face in the near future. The results will be actively offered as proposals, etc. to society.	149	114
MEXT	MEXT	Program for the Promotion of Improvement of Distinctive Joint Research Centers	To develop Joint Usage/Research Center for distinctive subject areas, including the humanities and social sciences, utilizing maximized potential of existing organizations with extensive scholarly literature and data, etc., to develop Joint Usage/Research Center	502	430



MEXT	MEXT	Program for the Development of Advanced Sensor Technologies to Search for Marine Resources	To promote technology development for tools, such as sensors, to help acquire high-precision data on existing amounts of marine resources such as submarine hydrothermal deposits and cobalt rich crust.	700	700
MEXT	MEXT	Initiatives for Atomic Energy Basic and Generic Strategic Research [literal translation]	To promote research by setting more strategic program themes based on policy needs, in basic and infrastructure research for the use and development of nuclear power in Japan	810	997
MEXT	MEXT	Development of Environmental Technology using Nanotechnology	To promote basic R&D of environmental technologies through improving problem-solving type research centers, to utilize the potential of nanotechnology research as a breakthrough, in which Japan has great potential	205	410
MEXT	JST	Development of System and Technology for Advanced Measurement and Analysis	To promote the development of pioneering measurement/analysis techniques and equipment that support unique, world-class research activities. In particular, this program aims to promote joint industry-academia development in the applied fields (manufacturing) in which users participate.	6,300	-
MEXT	JST	Project to develop "Innovative seeds"	To conduct competitive R&D in a manner suited to the relevant technology phase to promote the commercialization of the results based on research results (seeds) obtained by universities, public research institutes, etc., and to promote the return of benefits to society.	5,500	-
MEXT	JST	Collaborative Development of Innovative Seeds	To provide opportunities to identify potential technology seeds that may be hidden in the realm of basic research from the viewpoint of the industrial sector and conduct industry-academia joint feasibility studies (Note 1) to bring such seeds into the open. Once revealed, those seeds should be developed through industry-academia joint research (with the use of the matching-fund format) (Note 2) to help create innovations.	1,230	-
MEXT	JST	Science and Technology Incubation in Advanced Regions	To help coordinate creation of new regional industries and promote joint research towards industrialization to benefit from research results achieved by universities, with JST Innovation Plazas and JST Innovation Satellites used as footholds for such activities.	9,513	-
MEXT	JST	Collaboration of Regional Entities for the Advancement of Technological Excellence	To promote industry-academia-government joint research with a focus on specific research themes in fields where there are particularly strong regional needs for the foundation of startup companies. R&D activities will be conducted to foster new technologies and businesses, including the development of prototypes based on technology seeds created through basic research conducted by universities, etc.	2,192	-
MEXT	JST	Science and Technology Research Partnership for Sustainable Development	To promote international science and technology research partnerships with developing Asian and African countries by utilizing Japan's excellent science and technology in cooperation with ODA, to solve world-wide issues in the fields of environment, energy, disaster management, infectious diseases, and biological resources.	1,154	1,807
MEXT	JST	Japan Regional Innovation Strategy Program by the Excellence	To form R&D teams by collaboration of industry-academia-government while inviting talented researchers in related fields, mainly those working in specific fields in local universities	280	-
MEXT	JST	Strategic International Cooperative Program (Joint Research Type)	To promote international joint research in the target countries, regions and fields, which the government strategically specified as important, based on intergovernmental agreements.	292	417
MEXT	JST	Adaptable and Seamless Technology Transfer Program for Target-Driven R&D	To comprehensively and seamlessly promote industry-academia collaborative research by setting appropriate funding plans meeting the characteristics of each situation and issues of seeds search which examines the realization of joint R&D aiming at actual implementation. (Note 3)	3,200	16,580
MEXT	JST	Strategic Promotion of Innovative Research and development	To promote large-scale and long-term R&D in a consortium, including researchers from industry and academia, to establish technologies to be the core of new industry created from the outcomes of JST Basic Research Programs and other programs	550	-
MEXT	JST	Science and Engineering Entrepreneurship Development program for Vigorous researchers	To conduct R&D for creation of venture corporations by highly motivated and entrepreneurial young researchers, while attempting to create partnerships with university-related organizations that can support business establishment	148	-
MEXT	MEXT	Coordination funds for promoting space utilization	With a view of creating markets for industrial space use, to implement R&D on issues that were adopted after a review by outside experts, to expand base of space use by developing the use of satellite under the competitive environment among industry, academia, and government. (Note 4)	-	492
MEXT	JST	Advanced Low Carbon Technology Research and Development Program	To promote cutting-edge technology R&D needed to realize a low carbon society based on new scientific and technological knowledge, in order to reduce greenhouse gas emissions continuously and steadily in the medium or long term.	-	2,500
MEXT	JST	Industry-Academia Collaborative R&D Program	Promote effective industry-academia projects which specifically and effectively speed up innovations such as R&D strengthening foundations of basic research and technological research, and large-scale industry-academia R&D (Note 5)	-	6,224

Ministry of Education, Culture, Sports, Science and Technology Subtotal				386,639	369,120
MHLW	MHLW	Health and Labour Sciences Research Grants	To provide grants to researchers in universities to enhance their technical level and to maintain scientific promotion of administrative policies regarding medical care, welfare, and hygiene for people.	45,160	43,389
MHLW	Pharmaceuticals and Medical Devices Agency	Program for Promotion of Fundamental Studies in Health Sciences	To promote research to establish a broad technical foundation for development and discovery of innovative medicines, based on seeds and know-how of universities and public research institutions.	7,498	6,301
Ministry of Health, Labour, and Welfare Subtotal				52,659	49,690
MAFF	MAFF	Program for new technology development to activate agriculture, forestry, fisheries and food industry by cooperating Industry-academia and the government	To promote R&D projects jointly conducted by private-sector companies and public research organizations, including universities and incorporated administrative agencies, to create new industries and businesses in the agriculture, forestry, fisheries and food sectors and resolve immediate policy challenges.	198	-
MAFF	MAFF	Research and development projects for application in promoting new policy of Agriculture, Forestry and Fisheries	To promote technology development for practical application by using the proposal and public participation method in order to promote agricultural, forestry, and fishery policies and solve field problems, for agriculture, forestry and fisheries, and food industry development as well as regional revitalization.	6,516	6,183
MAFF	National Agriculture and Food Research Organization	Program for Promotion of Basic and Applied Researches for Innovations in Bio-oriented Industry	To supply funds for the development of technology seeds leading to the creation of new technology and business in the agriculture, forestry, fishing, and food industries, plus R&D to yield applied results by inviting proposals from the public.	6,800	5,994
Ministry of Agriculture, Forestry, and Fisheries Subtotal				13,514	12,178
METI	NEDO	Support fund for industrial technology research	To invite research theme proposals from young researchers at universities, incorporated administrative agencies, etc., fund individual research efforts to discover technology seeds and develop human resources that meet the needs of the industrial sector as well as society from the viewpoint of enhancing Japan's success in industrial technology.	4,445	3,092
METI	NEDO	Grant for Practical Application of University R&D Results under the Matching Fund Method	To provide financial aid for industry-academia joint R&D projects aimed at commercialization of university research results.	2,100	1,242
METI	NEDO	Research and Development Program for Innovative Energy Efficiency Technology	To implement R&D that can overcome demand-side issues, utilizing proposals from the public including private corporations for wide-ranging energy-conservation technology from fundamental to advanced level aiming at practical application.	7,000	7,000
METI	NEDO	The eco-innovation project aimed at discovering innovative technologies that promote sustainable innovation and global warming countermeasures	To implement research and surveys (feasibility studies) regarding T&D contributing to the creation of low carbon society and eco-innovation (environment- and human-oriented technology reform and social innovation), and regarding the technology seeds leading to innovative countermeasures against global warming.	400	-
METI	METI	Regional Innovation Creation R&D Program	To implement R&D by establishing research entities blending regional resources for the purpose of regional economy revitalization by new business and industry creation.	6,416	3,382
METI	Japan Oil, Gas and Metals National Corporation	R&D for Promotion of Oil and natural gas development	To conduct basic to applied research, based on proposals selected from public submissions, for unique and innovative technologies concerning oil and natural gas exploration and development.	417	267
Ministry of Economy, Trade, and Industry Subtotal				20,777	14,982
MLIT	MLIT	Construction Technology Research and Development Subsidy Program	To publicly invite proposals from researchers concerning research and development of technologies contributing to the sophistication and enhancement of international competitiveness of construction technologies.	500	250
MLIT	Japan Railway Construction, Transport and Technology Agency	Program for Promoting Fundamental Transport Technology Research	To seek to establish new technologies contributing to traffic safety, the preservation of the environment and the development of advanced traffic services by publicly inviting unique and innovative research proposals.	341	273
Ministry of Land, Infrastructure, Transport and Tourism Subtotal				841	523



MOE	MOE	Environmental Research and technology development fund	To promote R&D by commissioning environmental researches on relevant R&D to institutions such as experimental research institutions, which employ researchers who submitted superior proposals utilizing wisdom in industry, academia, and governments. (Note 6)	5,115	5,269
MOE	MOE	Research grants for promoting the sound material-cycle society	To promote research on S&T related to treatment of disposals, and then to promote administrative policies regarding the safety and appropriate treatment of disposals and formation of a recycling society. Also, to support enhancement of technical capabilities.	1,803	1,738
MOE	MOE	Program for development of technology to prevent global warming	To invite proposals from many areas of society and to commission (partially funded) to the public such as private corporations for R&D on technology to reduce emissions of energy-derived CO ₂ which needs to and can be realized at an early stage.	3,805	5,022
Ministry of the Environment Subtotal				10,723	12,029
Total				491,225	463,082

* The accumulations and the numbers in the totals may not match due to rounding off.

* Apart from this list, using the “Leading-edge Research Promotion Fund,” the “Funding Program for the World-Leading Innovative R&D on Science and Technology” (100 billion yen) and “Funding Program for Next Generation World-Leading Researchers” (50 billion yen) have been implemented as projects till FY 2013.

Note 1: Feasibility study: An experiment or an investigation conducted to examine whether a planned project can be carried out successfully.

Note 2: Matching fund: A scheme in which subsidies are provided to cover the project costs to be borne by universities and other parties involved, in an amount not exceeding the amount of funds provided by the companies involved.

Note 3: Collaborative Development of Innovative Seeds, Project to Develop Innovative Seeds, Science and Engineering Entrepreneurship Development program for Vigorous Researchers” and “Comprehensive Support Programs for Creation of Regional Innovation were constructively regrouped under this program.

Note 4: Changed to Competitive Fund in FY 2010

Note 5: Collaborative Research Based on Industrial Demand and the former Strategic Promotion of Innovative Research and Development and Development of Systems and Technology for Advanced Measurement and Analysis were constructively regrouped.

Note 6: Environmental research and technology development fund and Global Environmental Research Fund were consolidated in FY 2010.

Source: Created by MEXT

(2) Cultivation of competitive environments within organizations

At Japanese universities, basic funding plays an important role in supporting the foundation of the organization (personnel, education and research environment, etc), while competitive funds support a diverse range of excellent research and education programs.

Taking account of the fact that basic and competitive research funds thus have their respective functions, with each playing an important role, MEXT aims to expand the competitive fund scheme while endeavoring to secure sufficient basic funds (such as government subsidies for national university corporations and subsidies for private universities) as it considers how best to mix the two types of funds.

(3) Implementation of institutional reform related to competitive funds

The CSTP has implemented measures for further promotion of system reform including use, allocation, and evaluation of research funds, such as competitive funds, according to the Promotion Strategy PT compiled by the Expert Panel on Basic Policy Promotion in June 2007, and is currently following up on progress.

Presiding government ministries and fund allocation organizations have been working on unifying, simplifying, and rationalizing rules for using competitive funding based on the “Action Plan on Priority Measures in Science and Technology” set in July 2010.

(Establishment of a fair and transparent selection system)

When allocating competitive funds, each program attempts to develop a fair and highly transparent selection system for research projects, focusing on the contents of application and the capacity to implement it. Organizational restructuring for many programs promoted until 2010 has been recommended, including nominating examiners from a variety of fields. For instance, in relation to the Special Coordination Funds for Promoting Science and Technology, the issues adopted in the “Program to Develop Strategic Research Centers [literal translation]” included developing research centers and recruiting talented individuals meeting international standards of excellence. These individuals were evaluated in the middle-term and again at the end of the program, with committee members from other countries invited to make an evaluation in English. In addition, in the MAFF’s “Practical Technology Development Program for Promotion of New Agricultural, Forestry and Fishery Policies,” it is stated that the examination and evaluation systems include experts and journalists in the field, at farming, forestry, and fishing sites, as well as in the food industry, in FY 2010 as well.

(Feedback of screening results)

Regarding each competitive funding program, efforts are underway to promote disclosure of detailed screening results to ensure appropriate feedback to researchers. In FY 2010, feedback of screening results, including comments by judges to unsuccessful applicants, was continued and implemented for 34 of the 37 programs available.

(Enhancement of the functions of funding agencies)

In relation to competitive funding, fund allocating functions will be shifted to independent allocation institutions, while considering effective fund allocation and professional examinations. In FY 2010, 17 out of 41 total competitive fundings were allocated by the independent administrative agencies, indicating that the shift of fund allocation function is progressing steadily. In addition, funding agencies in charge of allocating competitive funds strengthen their systems by appointing program officers¹ and program directors² and enhancing research and analysis functions as well as administrative functions related to screening, fund distribution and management. Specifically, the National Institute of Biomedical Innovation (NIBIO), a funding agency under the jurisdiction of the Ministry of Health, Labour and Welfare, appointed program officers and directors as full-time adopted subject administrators, who have been giving guidance, advice, and evaluation on the commercialization of innovative pharmaceuticals and medical devices. JSPS, the funding agency under the jurisdiction of MEXT, established the Research Center for Science Systems, which conducts surveys and research on how to promote science in order to support JSPS activities. JST established the Center for Research and Development Strategy (CRDS), which considers the research fields that should be promoted as priorities.

In FY 2010, 39 out of 41 institutions were allowed to sign a multi-year contract or renew their contract beyond the fiscal year, while promoting efficiency and flexibility in the fund management in each competitive funding program.

¹ Responsible people with actual research experience including selecting programs and research projects of each program, evaluation, follow-ups, etc.

² Those who are placed in a superior position to administer the competitive funding system and its management



2 Enhancing the Competitiveness of Universities

(1) Creation of universities with world-class excellence in S&T and basic research

In order to make Japanese universities competitive internationally, cultivation of a competitive environment at universities, whether national, public, or private, is required. MEXT is implementing the “Global COE Program,” which further emphasizes enhancement of functions to develop young researchers and internationality of the centers to selectively support formation of international, outstanding education and research centers. As of FY 2009, MEXT has adopted 140 centers from 41 universities. In addition, in FY 2010, an interim evaluation was executed at the 67 centers adopted in 2008.

To further develop all basic research in Japan, inter-university research institutions and Joint Usage/Research Center were established, in which researchers can perform research cooperatively by utilizing the full potential of universities, regardless of whether the universities are national, public, or private. Regarding Joint Usage/Research Center, a system across national, public, and private universities was established, in which Joint Usage/Research Center are to be certified by the Minister of MEXT. As of FY 2010, 83 centers (74 national universities, 9 private universities) have been approved.

(2) Revitalizing universities by taking advantage of their individuality and distinctiveness

Universities must make greater contributions to the development of their host regions, as they are important sources of intellectual and human resources for the regions.

In relation to the regional revitalization plan utilizing the “Program for Revitalizing Regional Knowledge Centers” (decision made by the Regional Revitalization Headquarters), the Cabinet Office has been approving regional revitalization plans and, as a result, various projects in which universities and local communities collaborate with each other are also in progress.

MEXT has launched the SCF-funded program for the “Center for Creation of Regional Revitalization Human Resources Development” to establish “regional knowledge centers” through which local universities and host regions collaborated to utilize S&T in their development of competent personnel. The ministry has adopted and is supporting 53 such projects as of March 2011.

The Unified Secretariat for Regional Revitalization, based on the “Plan for Human Resources to Lead the Revitalization of Local Communities [literal translation],” has been supporting universities to work on community revitalization through, among other means, the initiation of “The Local Revitalization System Theory,” which aims to train human resources for local revitalization efforts.

3 Enhancing Systems for Creating Innovation

(1) Establishing world’s leading research centers

Over recent years, global competition in recruiting the best and brightest researchers has intensified. To maintain and improve Japan’s scientific and technological standing, we need to position ourselves within the global flow of outstanding human resources while creating research platforms that will naturally attract and amass such human resources in Japan.

Concerning this issue, MEXT has promoted its World Premier International Research Center Initiative (WPI) which aims for the establishment of “globally visible research centers,” each of which provides an excellent research environment and a high level of research capable of attracting the best frontline researchers from around the world. Each research center receives 1.3 billion yen on average per year, and

this support is scheduled to continue for 10-15 years. In FY 2010, one center was added and a total of six centers are active (Figure 2-3-4). It also aims to realize the creation of “a visible center,” which will verify progress and take other appropriate action, by building a strong follow-up system centered on the “WPI Committee” as its main organization.

● Figure 2-3-4/World Premier International Center Initiative (WPI) Schema

World Premier International Research Center Initiative (WPI)

Background

Over recent years, global competition in recruiting the best and brightest researchers has intensified. To maintain and improve Japan's scientific and technological standing, we will need to position ourselves within the global flow of outstanding human resources while creating research platforms that will naturally attract and amass such human resources in Japan.

Summary of program

The WPI Program establishes and operates world-class research centers that have at their core a group of very high-level researchers in a research environment of a sufficiently high standard, appointing frontline researchers from around the world as managers of the centers

Enhancement of WPI centers

Kyushu University's “International Institute for Carbon-Neutral Energy Research” was adopted and implemented in December, 2010, from which developments toward a low carbon society are expected to help ensure that Japan will be able to continue leading the world in technical innovations that contribute to the environment.

Program Contents

- Target
 - Basic research
- Support period
 - 10-15 years
- Project funding
 - Average of ¥1.3 billion a year
- Image of research center
 - 10-20 world-class PIs
 - Total number: 200
 - About 30% of all researchers are from overseas
- Attractive research and world-class living conditions
 - Strong leadership by the center director
 - A system of evaluation-based compensation
 - English established as the primary language for work-related communication

<p>Osaka University IFReC: Immunology Frontier Research Center -Clarification of dynamic immune system using bioimaging technology-</p> <div style="display: flex; align-items: center;"> <div style="font-size: 8px;"> <p>Institute Director: Shizuo Akira</p> <p>Most cited Immunologist in the world for 5 consecutive years.</p> </div> </div>	<p>Kyoto University iCeMS: Institute for Integrated Cell-Material Sciences - Creation of integrated field of cell science and material science focused on stem cells and Functional Architectures</p> <div style="display: flex; align-items: center;"> <div style="font-size: 8px;"> <p>Institute Director: Norio Nakatsuji</p> <p>Established Japan's first human ES cells and their contribution system. Leading drug discovery in the field.</p> </div> </div>	<p>Tohoku University AIMR: Advanced Institute for Materials Research -Discovery of innovative substances using the atom/molecule control method-</p> <div style="display: flex; align-items: center;"> <div style="font-size: 8px;"> <p>Institute Director: Yoshiro Yamamoto</p> <p>Awarded the Humboldt Prize in Germany, internationally prestigious authority of organic chemistry</p> </div> </div>
<p>(5 centers adopted in 2007) (1 center adopted in 2010)</p>		
<p>Kyushu University ICNER: International Institute for Carbon-Neutral Energy Research -Investigation of various issues such as production, storage, and use of H₂ and collection and storage of CO₂-</p> <div style="display: flex; align-items: center;"> <div style="font-size: 8px;"> <p>Institute Director: Petros Sofronis</p> <p>Explained experimental macro phenomenon which causes deformation of metal by micro-mechanical analysis.</p> </div> </div>	<p>The University of Tokyo IPMU: Institute for the Physics and Mathematics of the Universe -Clarification of the origin and the evolution of space through the collaboration of math, physics, and astronomy</p> <div style="display: flex; align-items: center;"> <div style="font-size: 8px;"> <p>Institute Director: Hitoshi Murayama</p> <p>Most cited Japanese scientist in particle theory and early cosmology in the world, at a young age of 45 years old.</p> </div> </div>	<p>National Institute for Materials Science (NIMS) MANA: International Center for Materials Nanoarchitectonics -Development of materials for sustainable development based on Nanoarchitectonics-</p> <div style="display: flex; align-items: center;"> <div style="font-size: 8px;"> <p>Institute Director: Masakazu Aono</p> <p>Successfully developed the world's first innovative material expected to be applied to brain computing</p> </div> </div>

(2) Enhancing various research funding programs suited to the various stages of R&D

(Enhancing of various kinds of basic research)

In order to create a foundation that constantly creates innovation, it is important to foster and develop various innovations from their early stages by supporting basic research sustainably. The Grants-in-aid for Scientific Research implemented by MEXT and the Japan Society for the Promotion of Science (JSPS) is an exclusive competitive research fund allowing for all kinds of academic research (research based on the original idea of each researchers), covering all fields from the humanities and social sciences to the natural sciences. In FY 2010, 20,000 projects were approved out of 89,000 applications, and including projects that have continued for some years, the number of research projects receiving support goes up to 57,000. By using peer review (evaluations by multiple researchers in similar fields), excellent research themes were approved. This together with the maintenance of research diversity and support of unique research activities, widen the scope of research activities and helps to develop sustainable research and create a vast amount of rich knowledge.



(Enhancing competitive research for the creation of innovation)

It is important to lead scientific discoveries and technological inventions realized by basic research beyond the confines of scientific papers so as to produce social and economic values and feedback that benefit to society and its people. Therefore, it is necessary to manage purpose-specific basic research and applied research programs appropriately in order to prevent them from becoming mere tools for satisfying researchers' own intellectual curiosity. In this context, JST promotes basic research related to strategically prioritized S&T items as part of its Basic Research Programs under a program officer invested with responsibility and discretion concerning the management of research progress in order to promote the strategic emphasis set by the government toward the creation of innovation. In addition, in order to promote the return of university research results to society through industry-academia collaboration, JST implemented the "Adaptable and Seamless Technology Transfer Program for Target-driven R&D (A-STEP)¹" and the "Industry-Academia Innovation Acceleration Project 'Strategic Promotion of Innovative Research and Development'.²" Also, since FY 2010, JST has been implementing the "Industry-Academia Innovation Acceleration Project 'Collaborative Research Based on Industrial Demand'.³"

In the Basic Research Promotion Program for Creation of Innovation under NARO, the evaluation committee conducts screenings of proposed research plans and evaluates plans already in place through its members' understanding of these projects' objectives toward agricultural contribution, forestry, fisheries and food industries, etc. Interim evaluation is conducted on ongoing research projects, on which research outcomes were evaluated and, based on the results, the research plans revised. Program offices will convey the results of the evaluation to the researchers concerned in order to ensure that research plans are implemented in accordance with the objectives of these projects.

(Establishment of advanced research centers in the interdisciplinary fields)

The 3rd Science and Technology Basic Plan points out that it will be effective to make intensive investments with the support of the industrial sector toward the establishment of research and education centers emphasizing advanced fields of research based on the view that Japan should pioneer the development of new research fields to foster innovation.

In FY 2006, MEXT launched the SCF-funded program Creation of Innovation Centers for Advanced Interdisciplinary Research Areas, which supports organizations endeavoring to establish centers that would conduct R&D, starting from the basic research stage, in advanced interdisciplinary fields through industry-academia collaboration with the goal of achieving commercialization in the future. Currently, 21 research organizations are engaged in such efforts. A total of nine centers, which were evaluated for continuation in the re-examinations in FY 2008 and FY 2009, are implementing full-scale operation. Moreover, in 2010, a total of 6 projects, including the projects newly adopted in FY 2008 (3 projects) and those permitted for re-entry into the re-examination of FY 2009 (3 projects), were re-examined. As a result of the re-examination, 2 ongoing projects were chosen for full-scale implementation in FY 2011, 1

¹ Establishing and comprehensively and seamlessly promoting funding which best responds to themes and characteristics of R&D.

² Implementing large-scale and long-term R&D by consortiums consisting of multiple industry-academia research teams formulated following results of research promotion programs such as the "JST Basic Research Programs."

³ Providing "Collaboration Place" where discussions are held between industry and academia to promote basic research at universities, etc.

re-entry project was allowed application for the re-examination of FY 2011 though not fully implemented, and 3 projects were neither given permission for application for re-entry in FY 2011 nor implemented.

METI is conducting development of “advanced innovation centers [literal translation]” (joint R&D facilities), which will be used to work on the development of applied technologies from research, product tests, and for other purposes, while cooperating with universities, research institutions, and corporations to construct structures. As of FY 2009, 19 centers have been adopted as centers to implement joint research on low-carbon society and medical and health care and progress is being made in their installation. Also, to include local views, METI conducted fund raising for implementation of the “Industry-Academia-Government Collaboration ‘Cross Link Base for Technology’ (joint R&D facilities) [literal translation]” to be appropriated in the FY 2010 supplementary budget.

(Reform of research funding systems across ministerial boundaries)

The Cabinet Office (CAO) reforms the public research funding systems by building a “National R&D Database” accumulating data to be utilized for macro analysis, which is necessary for formulating the S&T Basic Plan and research and deliberations concerned with resource allocation.

The research funding systems sponsored by government ministries and agencies and R&D programs conducted by research organizations in the industrial, academic and governmental sectors cover various stages of development, from basic research to commercialization, and it is necessary to establish a mechanism that advances development persistently across various programs and organizations right up to the final stage of commercialization. In FY 2010, collaboration cases with projects of other ministries were created across ministries and agencies for the Okinawa Innovation Creation Project [literal translation] of the Cabinet Office. In addition, JST and the New Energy and Industrial Technology Development Organization (NEDO) held a “JST-NEDO Technical Information Exchange Program [literal translation]” to provide information to each other in relation to research outcomes of common interest under the aim of creating more seamless research results.

(3) Establishment of a sustainable and advanced industry-academia-government collaboration system

As the 21st century is often referred to as the “century of knowledge,” the creation and utilization of that knowledge is indispensable to the future development of Japan, and industrial-academia-government collaboration is an important means through which the country can generate a constant stream of innovation. Although industry-academia-government collaboration in Japan has recently made significant progress, the level of collaboration falls short when compared to the world-class research potential of Japanese universities. Therefore, it is necessary to promote industry-academia-government collaboration further, and for our country to increase its efforts in this area.

(Enhancement into real industry-academia-government collaboration)

Since the corporatization of national universities in April 2004, the industry-academia-government collaboration activities at universities and the like has shown steady results in general. In FY 2009, partly due to the global economic recession after the collapse of Lehman Brothers, the number of joint research projects between universities and the private sector was 14,779 (a decrease of one percent from the