3.2.2.9 Promotion of Science and Technology for Safety, Security and Spiritual Enrichment

Toward realization of the concept of “Protect nation's health and safety” offered in the 3rd Basic Plan as a principle that Japan should aim for, as well as of the policy goal of being “the world's safest nation,” the Ministry of Education, Culture, Sports, Science and Technology in April 2006 established the Committee on Science and Technology for a Safe and Secure Society under the Council for Science and Technology Subdivision on R&D Planning and Evaluation and is holding discussions on fields to be addressed to develop a safe and secure society, technical issues, and specific measures for the promotion of research and development. In addition, the “2nd Japan-U.S. Workshop on Science and Technology for a Secure and Safe Society” was convened in March 2005 to discuss how Japan and the United States can cooperate in the fields of science and technology in response to the various risks and threats that society faces, and is extending cooperation in areas of shared concern.

In addition, research and development utilizing competitive funding, such as the Special Coordination Funds for Promoting Science and Technology and the Project for Promotion of Strategic Creative Research (Japan Science and Technology Agency), is being conducted in order to promote research and development on the creation of unique digital content, as well as human resources development.

3.3 Reform of Japan's Science and Technology System

3.3.1 Reform of Japan's Research and Development System

3.3.1.1 Construction of Research and Development Systems for Producing Outstanding Results

(1) Maintenance of a Competitive Research and Development Environment

In terms of competitive funding to form a competitive research and development environment, the system reform to maximize its effectiveness was promoted, while the funding was expanded based on the goals set in the Basic Plan.

The competitive funding for each ministry is shown in Table 3-3-1.

Table 3-3-1 Comprehensive table of competitive funding

Name of ministry/ agency	Sponsoring institution	Name of program	FY2004		FY2005	
			Budget (million yen)	Indirect expenses introduced (million yen)	Budget (million yen)	Indirect expenses introduced (million yen)
Cabinet Office, Government of Japan	Secretariat of the Food Safety Commission	Research on Technology for Assessing Food Health Risks	–	–	123	28
	Okinawa Industry Promotion Public Corporation	Program for Promotion of Industry-University-Government Joint Research in Okinawa	–	–	401	0
Subtotal			–	–	524	28
Ministry of Internal Affairs and Communications	Ministry	Promotion Programme Strategic Information and Communications R&D	3,033	632	3,181	708 (Upper limit)
	Institute of Information and Communications	Program for Promotion of Basic Research in the Information and Communications Sectors	304	39	206	47 (Upper limit)
	Institute of Information and Communications	Advanced technology development for pioneering new communications and broadcasting areas (Telecom incubation)	748	0	640	18 (Upper limit)
	Institute of Information and Communications	Program for Promotion of Private-Sector Basic Technology Research	10,400	2,400	10,300	2,377 (Upper limit)
	Fire and Diaster Management Agency	Program for Promotion of Science and Technology Research for Fire Safety and Disaster Prevention	300	68	370	67
Subtotal			14,785	3,139	14,696	3,217 (Upper limit)
Ministry of Education, Culture, Sports, Science, and Technology	Ministry, Japan Society for the Promotion of Science	Grants-in-Aid for Scientific Research	183,000	13,553	188,000	14,255
	Japan Science and Technology Agency	Basic Research Programs	46,329	2,958	47,595	2,993
	Ministry	Special Coordination Funds for Promoting Science and Technology (Chosei-hi)	38,600	3,623	39,500	4,085
	Ministry	21st Century COE Program	–	–	38,171	1,470
	Ministry	Promotion of R&D for Key Technologies (Integration of nanotechnology、life sciences based on social needs, and next-generation IT infrastructure)	–	–	7,874	2,362 (Upper limit)
	Ministry	Plan for Promotion of Global Observation Systems	–	–	1,017	208
	Ministry	Innovative Nuclear Research and Development Program	–	–	12,145	12,145 (Upper limit)
	Japan Science and Technology Agency	Development of Systems and Technology for Advanced Measurement and Analysis	3,300	690	4,000	861
	Ministry/Japan Science and Technology Agency	Public Proposal System for Ingenious Technology Development Research	3,316	170	3,208	560
	Ministry	Support System for Creation of University-Derived Venture	1,634	337	25	0
	Japan Science and Technology Agency	Creation and Support Program for Start-ups from Universities	2,697	177	–	–
	Japan Science and Technology Agency	Project to develop "innovative seeds"	–	–	9,674	813
	Japan Science and Technology Agency	Science and Technology Incubation Program in Advanced Regions	–	–	4,980	33
	Japan Science and Technology Agency	Collaboration of Regional Entities for the Advancement of Technological Excellence (CREATE)	–	–	4,675	4
	Ministry	Grants for future pioneering science research	3,576	0	–	–
Subtotal			282,453	21,508	360,865	39,789 (Upper limit)
Ministry of Health, Labour, and Welfare	Ministry	Health and Labour Sciences Research Grants	37,930	2,434	38,187	1,655 (Upper limit)
	Pharmaceuticals and Medical Devices Agency	Program for Promotion of Basic Research in the Health Care Sector	2,224	444 (Upper limit)	2,224	444 (Upper limit)
Subtotal			40,154	2,878 (Upper limit)	40,411	2,099 (Upper limit)

Name of ministry/ agency	Sponsoring institution	Name of program	FY2004		FY2005	
			Budget (million yen)	Indirect expenses introduced (million yen)	Budget (million yen)	Indirect expenses introduced (million yen)
Ministry of Agriculture, Forestry, and Fisheries	Bio-oriented Technology Research Advancement Institution	Program for promotion of basic research for creation of new technologies and new sectors	4,030	614	4,455	825
		R&D program for creation of new enterprises	735	0	–	–
	Bio-oriented Technology Research Advancement Institution	Research and Development Program for Bio-Industry Initiatives	1,760	329	2,670	521
	Ministry	Grant for Private-Sector Research in Food/Agriculture, Forestry and Fisheries	–	–	1,433	207
	Ministry	Technology Development Project for the Creation of Collective Private Agribusiness	560	0	–	–
	Ministry	Research project for utilizing advanced technologies in agriculture, forestry and fisheries	3,000	675	3,846	872 (Upper limit)
Subtotal			10,084	1,618	12,403	2,425 (Upper limit)
Ministry of Economy, Trade, and Industry	New Energy and Industrial Technology Development Organization	New Energy and Industrial Technology Development Organization	5,821	1,099	6,164	6,164 (Upper limit)
	New Energy and Industrial Technology Development Organization	Grant for Practical Application of University R&D Results under the Matching Fund Method (R&D)/ Grant for Feasibility Study of University Projects under the Matching Fund Method (F/S)	–	–	3,162	3,162 (Upper limit)
	Ministry	Consortium R&D Project for Regional Revitalization	–	–	13,720	13,720 (Upper limit)
	Ministry	Innovative and Viable Nuclear Energy Technology (IVNET) Development Project	–	–	2,183	2,183 (Upper limit)
	Japan Oil, Gas and Metals National Corporation	Research for Promoting Development/Utilization of Oil/Natural Gas	–	–	4,586	4,586 (Upper limit)
Subtotal			5,821	1,099	29,815	29,815 (Upper limit)
Ministry of Land, Infrastructure, and Transport	Japan Railway Construction, Transport and Technology Agency	Program for Promoting Fundamental Transport Technology Research	445	35	444	44
	Ministry	R&D fund support program for the development of construction technology	250	53	350	75
Subtotal			695	88	794	119
Ministry of the Environment	Ministry	Global Environmental Research Fund	3,015	232	3,015	396 (Upper limit)
	Ministry	Environmental Research and Technology Development Fund	815	139	815	188 (Upper limit)
	Ministry	Ministry of the Environment Waste Management Research Grants	1,150	141	1,150	160
	Ministry	Project for Development of Technology for Global Warming Countermeasures	1,634	490 (Upper limit)	2,676	803 (Upper limit)
Subtotal			6,614	1,002 (Upper limit)	7,656	1,547 (Upper limit)
Total			360,606	31,332 (Upper limit)	467,163	79,039 (Upper limit)

Based on the "Reform of the Competitive Funding System (opinion)" prepared by the Council for Science and Technology Policy in April 2003, progress was made on the following reforms during FY2005: further expansion of indirect expenses; posting of program officers with research backgrounds to each funding agency to improve the implementation structure for managing the array of businesses of the competitive funding system consistently, etc.

●Competitive funding of each office and ministry

1) Cabinet Office

In order to smoothly implement assessment of the effect of food on health (risk assessment) concerning various hazards to food such as food additives, chemical substances, microorganisms and viruses, and prions on the basis of scientific knowledge, the Cabinet Office is implementing "Research on Technology for Assessing the Risk of Food on Human Health," aimed at promoting the development of research on guidelines for risk assessment and standards for the safety assessment

2) Ministry of Internal Affairs and Communications

The Ministry of Internal Affairs and Communications is implementing the "Strategic Information and Communications R&D Promotion Programme." This project aims to actively promote unique and innovative research and development that is in keeping with priority strategic targets in

order to create world-leading intellectual assets, increase the level of researchers by creating competitive research environments, and improve research and development capabilities in information and communications technologies.

In addition, the ministry is implementing the "Promotion Program for Fire and Disaster Prevention Technologies," which aims to promote practical and significant technological development and research in its efforts to solve issues related to fire and disaster prevention in Japan, including the upgrading of rescue tools and equipment, and the development of methods for rapidly and efficiently searching for survivors under debris.

3) Ministry of Education, Culture, Sports, Science and Technology

The Grants-in-Aid for Scientific Research aims to dramatically advance academic research (research based on the free-thinking of researchers) across all fields including the humanities and social sciences as well as the natural sciences, and from basic research through to applied research. The program supports creative and pioneering research that passes a peer review[27] process.

Basic Research Programs aims to produce new technologies that will lead to the development of science and technology and to the creation of new industries. Japan Science and Technology Agency establishes Research Areas based on Strategic Sectors, which Ministry of Education, Culture, Sports, Science and Technology designates on the basis of social and economic needs and under each Research Areas Basic Research Programs strategically promotes basic research mainly in four key research fields.

The Special Coordination Funds for Promoting Science and Technology (Chosei-Hi) is a competitive research fund managed by the Ministry of Education, Culture, Sports, Science and Technology along with the policies of the Council for Science and Technology Policy. Chosei-Hi promotes leading and/or cross-sectional measures to achieve the policy objectives laid down in the Science and Technology Basic Plan. Since FY2005, "Research

and Development Program for Resolving Critical Issues", which is mission-oriented research and development focusing on policy-inducing effects, have been promoted.

The 21st Century COE Program is focusing on providing support for the establishment of world-class COE through national, public and private universities, and thus promoting the creation of internationally competitive and world's highest-level universities.

The Key Technology R&D Program has been promoting R&D to be strategically handled in the areas of life science, information and telecommunications, nanotechnology and materials, in order to seek further development of key technologies as the basis of maintaining and developing Japan, including the development of socioeconomy and ensuring safety and security.

The Earth Observation System Construction Plan has been promoting technological development and observation research in areas of study where Japan should take a leading role toward the construction of the Earth observation system declared in the Earth Observation Summit.

The Nuclear Power System R&D Project has been conducting R&D that will contribute to the realization of an innovative nuclear power system which enables the following, concerning the next generation of nuclear fuel cycles: to make security systems clearer and easier to understand, make the most of fuels through high-efficient utilization, and substantially reduce the discharge of radioactive wastes.

The Project for Advanced Metrological Analysis Technology and Equipment Development has been promoting the development of advanced metrological analysis technology and equipment, and related systems that will contribute to creative and original R&D to meet the needs of the world's most advanced research.

The Public Proposal System for Original and Innovative Technology Development Research and its successor, the Innovative Technology Development Research Project have been encouraging the creation of new industries by further fostering innovative and highly creative technologies of private sectors into more innovative and practical technologies

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[27] Peer review: review by researchers in some fields similar to the specialized fields

In order to facilitate the practical use of the fruits of original research (seeds) at universities and public research institutes, the Project for Original Seeds Expansion has been conducting technological development appropriate for a challenged technology phase, and promoting the return of such fruits to society.

The Project for R&D Promotion in Key Regions has been conducting activities for coordination, technological development and support for new ventures that will contribute to the creation of local new industries, and promoting technological transfer at Research Fruit Utilization Plaza and JST satellites.

The Project for Collective Area Joint Research concentrates on joint research among industry, academia and government aimed to handle individual R&D issues in fields where needs for commercialization is high for the area.

4) Ministry of Health, Labour and Welfare

The Ministry of Health, Labour and Welfare strives to improve technology standards through the scientific promotion of government measures related to health and medical care, welfare, environmental health, occupational safety and health, and other aspects relevant to the citizens of Japan.

The Grant for Health Sciences promotes research in four main areas, including (1) the administrative policy research area; (2) the life science infrastructure research areas, which includes "Research on Human Genome Tissue Engineering;" (3) the areas of research on disease/handicap measures, such as the "Third Comprehensive Cancer Strategy" and "Comprehensive Research on Measures for Lifestyle-related Diseases including Cardiovascular Diseases," and (4) comprehensive research on safety management in the drug, food and technology area, which includes "Research on AIDS, Hepatitis and Emerging and Re-emerging Infectious Diseases."

5) Ministry of Agriculture, Forestry and Fisheries

The Ministry of Agriculture, Forestry and Fisheries is implementing programs including the "Research Project for Utilizing Advanced Technologies in Agriculture, Forestry and Fisheries," which aims to promote in-the-field experiments and research in the agriculture, forestry, and fisheries sector, and the "Technology Development Project for the Creation of Collective Private Agribusiness," which aims to revitalize agribusiness through the creation of new industries, and the "Project to Support Revitalization of Regional Food Industry, etc.," which aims to solve various issues surrounding the food industry, etc., through short-term R&D. In addition, the National Agriculture and Bio-oriented Research Organization is implementing the "Project for the promotion of Basic Research for the Creation of New Technology and New Sectors," which facilitates sophisticated use of biofunctions, and the "Project for the Promotion of Research on the Integration of Different Fields for the Creation of Bio-oriented Industries," which aims to create new industries and enterprises through biotechnology and other bio-oriented advanced technologies.

6) Ministry of Economy, Trade and Industry

The Ministry of Economy, Trade and Industry is implementing the "R&D for Regional Rebirth Consortium," which aims to conduct advanced R&D with emphasis on practical application of the technologies of universities, etc., by organizing a solid system for government-industry-academia joint research in the area (Regional Rebirth Consortium), and "Innovative Technology Development of Practical Nuclear Energy Program," which aims to improve safety and economic efficiency concerning nuclear power generation and nuclear fuel cycles by inviting innovative and original R&D subjects and supporting the development.

Programs implemented by the New Energy and Industrial Technology Development Organization (NEDO) include the "Industrial Technology Research Grant Program," which aims to support the research of young researchers at universities, etc., who make distinguished proposals on technological topics that have large expectations from industries, and "R&D for the Creation and Practical Use of University-based Program," which aims to support distinguished R&D jointly conducted by private companies and universities in order for the companies to put academic research results to practical use. In addition, the Japan Oil, Gas and Metals National Corporation is implementing the "Development and Promotion of Utilization of Oil and Gas Program," which aims to promote R&D by inviting original and innovative technological topics concerning oil and gas exploration development.

7) Ministry of Land, Infrastructure and Transport

Through the Japan Railway Construction, Transport and Technology Agency, the Ministry of Land, Infrastructure and Transport implements the "Program for Promoting Fundamental Transport Technology Research." This program promotes creative and innovative basic research aimed at generating innovative new technologies with the potential for breakthrough technological innovation. In addition, the Construction Technology Research and Development Subsidy Program provides research and development subsidies to researchers at universities, etc., in order to promote cooperation with non-construction sectors, to promote innovations in construction technology in broad interdisciplinary areas, and to utilize innovative results in public works projects.

8) Ministry of the Environment

The Ministry of the Environment utilizes the Global Environment Research Fund to promote research into global environmental conservation, based on the Comprehensive Promotion Program for Global Environment Research, Monitoring and Technology that is drawn up at the Council of Ministers for Global Environmental Conservation. The Global Environment Research Fund provides prioritized and strategic promotion for the development and diffusion of environmental technologies, while the Fund for Waste Disposal Science Research is used to promote restrictions on waste disposal and to encourage recovery and reuse, and develops research on all kinds of research into appropriate waste disposal measures. In FY2004, the "Project to Develop Technology for Global Warming Countermeasures" was established for the purpose of promoting practical use of basic CO2 emission control technologies.

(2) Improving the Mobility of Personnel through Popularization of the Fixed-term System

In order to train researchers with broad perspectives who are rich in creativity and originality, and to achieve competitive and dynamic R&D environments, it's important that the mobility of researchers is improved and that researchers gain experience at many kinds of research sites.

Aiming towards this kind of improved mobility of researchers, employment of fixed-term researchers became possible at national experimental research institutions in accordance with "the Law Concerning the Special Measures for the Recruitment, Remuneration and Working Hours of Researchers with Fixed Terms in Regular Service" enacted in 1997. The results to date are shown in Table 3-3-2.

Table 3-3-2 The state of employment under the "Law Concerning the Special Measures for the Recruitment, Remuneration and Working Hours of Researchers with Fixed Terms in Regular Service"

	No. of institutions	No. of personnel used
National research institutes	43	1,170
Of which, by invitational type	25	184
Of which, researcher-fostering type	39	986

Note: The number of personnel used indicates the cumulative number as of October 1, 2005.
Source: Survey by National Personnel Authority (October 2005)

For universities and inter-university research institutes, "the Law Concerning the Fixed-Term Appointment of Faculty Members at Universities," enacted in 1997, gives them the discretion to adopt the fixed-term system. The status of the fixed term system adopted on the basis of this law is shown in Table 3-3-3.

Table 3-3-3 State of the fixed-term systems introduced under "the Law concerning the Fixed Term Appointment of Faculty members at Universities"

	No. of universities, etc.	No. of instructors used
National universities	88	5,485
Public universities	20	292
Private universities	139	2,580
Inter-university research institutions	10	107

Note: In Private universities, it is limited to full-time staff.
Source: Survey by MEXT (October 2005)

(3) Increasing the Independence of Young Researchers

If Japan is to aim towards becoming an advanced science- and technology- oriented nation, it is critical to foster and secure exceptional young researchers with abundant creativity who will lead future research activities.

In consideration of the Basic Plan, which calls for "ensuring the independence of young researchers in order to maximize the abilities demonstrated by distinguished young researchers," the Central Education Council reviewed the teachers' structure at universities, and proposed review of the status of assistant professors and assistants in the report, "The Future Form of Japan's Higher Education," compiled in January 2005.

Following the proposals, "the School Education Law" was revised in July 2005, and it was decided to conduct the improvement of the teachers' structure at universities (such as the creation of "*jun-kyoju*" or associate professor and "*jo-kyo*" or assistant professor) from April 2007. The new post of "Jo-kyo" is clearly defined as the first-stage post of a university teacher which enables young researchers to conduct their own education and research. The system revision is expected to contribute to the further development of an environment in which young researchers seeking to become a university teacher are able to improve their qualities and abilities while conducting education and research activities based on their flexible thinking.

●Support for creative research activities by young researchers

Many of the researchers around the world who produce world-class research results have already conducted research in their 30s that laid the groundwork for later achievements. The relevant government ministries, therefore, promote various efforts to support creative research activities by young researchers during their foundation years.

1) Ministry of Internal Affairs and Commnications

Under the "Program for Promoting Strategic Information and Communications Research and Development," established in FY2002, the "research and development program for nurturing young advanced-IT researchers" was instituted with the aim of nurturing young researchers aged 35 or younger.

2) Ministry of Education, Culture, Sports, Science and Technology

MEXT is working to expand competitive funding for young researchers by appropriating approximately 26.7 billion yen of the Grants-in-Aid for Scientific Research for young researchers in order to create a system in which young researchers who have flexible mind-sets and a spirit of challenge can conduct independent research.

3) Ministry of Agriculture, Forestry and Fisheries

The National Agriculture and Bio-oriented Research Organization (NARO) is working through the Basic Research Promotion Project, which aims at the creation of new technologies and new sectors, to institute a young researcher support program that prepares the conditions for objective research by young researchers with flexible thinking and ambition.

4) Ministry of Economy, Trade and Industry

NEDO is implementing creative research activities by young researchers through the "Industrial Technology Research Grant Program" established in FY2000.

5) Ministry of the Environment

The Ministry is supporting research by young researchers to help improve their research by setting up a special reserve to the ministry's competitive funding.

●Support for postdoctoral researchers

The relevant government ministries can expand opportunities to improve the quality of postdoctoral researchers by having them participate in research projects funded with the expanded competitive funding, as well as promote various other systems to support postdoctoral researchers.

1) Ministry of Education, Culture, Sports, Science and Technology

Through the Japan Society for the Promotion of Science, MEXT has been promoting the "Research Fellowships for Young Scientists" program that

supports postdoctoral researchers who possess superior research abilities so that they can proactively engage in their research. Since FY2005, this program strives to achieve qualitative results by improving the system for selecting postdoctoral researchers and research reports.

Under Basic Research Program of Japan Science and Technology Agency young researchers, including postdoctoral researchers having flexible ideas and challenging spirits, researches to form intellectual properties and create new technologies.

Various other support programs for researchers are also being promoted, such as the Institute of Physical and Chemical Research's (RIKEN) "Special Postdoctoral Researchers Program," which provides a place where highly creative young researchers can proactively conduct research upon their own initiative at RIKEN's research facilities.

2) Ministry of Health, Labour and Welfare

The Ministry of Health, Labour and Welfare has adopted measures to support and utilize over 500 postdoctoral researchers through its Health and Welfare Sciences Research Promotion Project.

3) Ministry of Agriculture, Forestry and Fisheries

The Ministry of Agriculture, Forestry and Fisheries has adopted measures to utilize 147 young researchers as part of the Basic Research Promotion Project of the National Agriculture and Bio-oriented Research Organization (NARO), which aims to create new technologies and research fields. In total, the Ministry adopted measures to utilize 263 postdoctoral researchers.

4) Ministry of Economy, Trade and Industry

The Ministry of Economy, Trade and Industry provided support and adopted measures to utilize a total of 57 postdoctoral researchers in FY 2005 through the industrial technology fellowship program run by the New Energy and Industrial Technology Development Organization (NEDO).

(4) Reform of Japan's Evaluation Systems

To promote science and technology, it is important to conduct appropriate evaluation, which stimulate researchers and encourage outstanding research and development activities. Effective evaluation will increase the efficiency and vitality of R&D activities, facilitate better R&D achievements, and nourish superior researchers. Evaluation also offer benefits to society and the economy, and also serve to provide accountability to the public.

The "National Guidelines on the Method of Evaluation for Government R&D" was revised, and a new set of guidelines were decided by the Prime Minister on March 29, 2005 in response to the follow-up studies conducted by the Council for Science and Technology Policy. The studies found that the progress of R&D evaluation system reform is partly insufficient and new issues emerged in implementing the evaluation.

Under the revised national guidelines, all ministries and agencies draw up detailed guidelines specifying evaluation methodologies. The Ministry of Education, Culture, Sports, Science and Technology, which accounts for more than 60% of the expenditures related to science and technology, revised the "Guideline for Evaluation of Research and Development in MEXT" in September 2005, and included in it all possible details in accordance with the following three orientations: (1) stimulate researchers who venture into creativity, and conduct evaluation that will help find, expand and nourish superior R&D, (2) Secure evaluation resource and strengthen evaluation support systems, (3) Reform for effective and efficient evaluation systems. In one example under the guideline, MEXT is conducting ante evaluations of new and existing R&D topics worth more than 1 billion yen by utilizing external evaluation, and using them as the criteria for judging the appropriateness of budget requests. Both appropriate interim and ex post evaluation are also being conducted.

In addition, the Cabinet Office, in cooperation with related ministries and agencies, registered in a single, cross-ministerial R&D database system, data on researchers, funds, accomplishments, and evaluation results for government-funded individual R&D topics. The database is being used by the Cabinet Office and related ministries and agencies.

For other actions in this area, evaluation of the performance of incorporated administrative R&D agencies are now being implemented based on the Law on the General Rules of Incorporated Administrative Agencies (1999 Law No.103). As for national university corporations, evaluation of their performance is implemented based on the "National

University Corporation Law" (Law No. 111 of 2003) (As for the progress of educational research, the outcomes of evaluation conducted by the National Institution for Academic Degrees and University Education are highly respected). In addition, under the Law for Evaluations of Policies Performed by Administrative Institutions (2001 Law No.86), which took effect in April 2002, it is now mandatory to conduct ante evaluation for R&D topics that are expected to incur large costs.

(5) Flexible, Effective, and Efficient Program Management

Flexible, effective, and efficient program operations and the efficient use of funding are necessary in accordance with the characteristics of research and development. For this reason, at the national experimental research institutions, efforts are being made to fully utilize organizational structures that allow mobile and flexible changes based on internal measures. These changes are aimed at responding to progress and changes in research and development, including the priority allocation of funding at the discretion of institute directors, etc., in response to research performance, and the placement of researchers and the establishment of research periods in line with research topics.

The Ministry of Education, Culture, Sports, Science, and Technology uses the Special Coordination Funds for Promoting Science and Technology (Chosei-hi) to position "Urgent Research and Development" as a program to ensure a timely response to situations requiring urgent measures to be taken during the fiscal year.

With regards to research presentations at study meetings, Section 30 of the Japanese Patent Law stipulates that "the fact that the person having the right to obtain a patent" "has made a presentation in writing at a study meeting held by a scientific body designated by the Commissioner of the Patent Office" shall be deemed as an exception to lack of novelty of invention. The Japan Patent Office (JPO) has been making this provision applicable to research activities at universities.

(6) Utilizing Personnel and Developing Diversified Career Paths

To invigorate research activities, universities and research institutions are expected to make active efforts to ensure the involvement of diversified personnel.

In the "Critical Measures of the Third-stage Science and Technology Basic Plan" released in April 2005, the Council for Science and Technology's Special Committee on Science and Technology Basic Plan pointed out the importance of expanding career paths of foreign researchers, promoting the invitation of foreign researchers to Japan, and developing an environment for receiving them. In FY2005, the Japan Society for the Promotion of Science worked to enhance its researcher exchange programs, including its Postdoctoral Fellowships for Research Abroad and Postdoctoral Fellowships for Foreign Researchers. In order to promote active roles of female researchers, the report suggested the expansion of measures aimed to support their childbirth and child-rearing. Also, to support female researchers who interrupt their research for maternity leave, the Grant-in-Aid for Scientific Research has been employed flexibly so that they can resume research after one-year's maternity leave. In a like manner, the "Research Fellowships for Young Scientists" program conducted by the Japan Society for the Promotion of Science has been permitting interruptions and extensions of fellowships at the request of young researchers for the purpose of childbirth and child-rearing. The program has been improved by allowing such researchers to choose partial scholarship payment during interruptions.

In the "Career Paths of Diversified Young Researchers (Sorting out of Study)" released in July 2005, the Council for Science and Technology's Committee on Human Resources pointed out the importance of systematic efforts by every research institute to secure opportunities for young postdoctoral researchers to work not only at universities and public research institutes but at various fields in society including the industry arena, and to provide support for pursuing another job other than a career in research, in cooperation with industry and academic societies.

As part of developing various career paths, the Japan Society for the Promotion of Science and the JST have established the program manager position for people with research experience who will be responsible for a consistent operation for the competitive funding system.

(7) Achieving a Creative Research and Development System

To create excellent research results and to realize a research and development system capable of pioneering a new era, the heads of research institutions need to use superior concepts and leadership to promote organizational reform, and to create Centers of Excellence (COEs) for personnel training and R&D with international appeal.

In terms of the Special Coordination Funds for Promoting Science and Technology (Chosei-hi), the "Strategic Fostering Research Centers of Excellence" program has been in operation since FY2001. The program fosters and supports R&D institutions that make creative and pioneering attempts to build novel R&D systems and reform organizational operations, whose highly successful efforts influence other R&D institutions.

As table 3-3-4 shows, three institutions were newly selected as institutions to implement the program in FY2005, bringing to 13 institutions engaged in advanced organizational reform.

Table 3-3-4 Strategic Fostering Research Centers of Excellence (Implementing institutions)

	Name of targeted institution	Concept
FY2001	Research Center for Advanced Science and Technology, The University of Tokyo	Open laboratory for human- and society-focused advanced science and technology
	Frontier Research Center, Graduate School of Engineering, Osaka University	Plan for Frontier Research Center
FY2002	Horizontal Medical Research Organization, Graduate School of Medicine, Kyoto University	Formation of an open medical research center of excellence through harmonization of advanced fields
	National Institute of Advanced Industrial Science and Technology innovation Center for Start-ups	Innovation Center for Start-ups
FY2003	Tohoku University Biomedical Engineering Research Organization	Formation of an advanced biomedical engineering center of excellence
	Creative Research Initiative "Sousei", Hokkaido University	Plan for a Hokaido University research and business park
	International Center for Young Scientists, National Institute for Material Science	Specified District Young and International Innovation
FY2004	User Science Institute, Kyushu University	Institute for 'Integration of Technology and Sensitivity' with Research Based upon the Needs of the User
	Consolidated Research Institute for Advanced Science and Medical Care, Waseda University	Formation of Consolidated Research Center for Advanced Science and Medical Care
	Research Institute for Digital Media and Content, Keio University	Research Institute for Digital Media and Content
FY2005	International Research and Educational Institute for Integrated Medical Sciences (IREIIMS), Tokyo Women's Medical University	Creation of an international research and educational institute for integrated medical sciences
	Solution Research Organization, Tokyo Institute of Techology	Integrated Research Institute, Tokyo Institute of Techology
	Integrated Research System for Sustainability Science, Tokyo University	IR3S (Integrated Research System for Sustainability Science) Program

3.3.1.2 Promotion and Reform of R&D at Japan's Main Research Institutes

(1) Universities and Inter-University Research Institutes

As one of their directives, Japan's universities and inter-university research institutes are entrusted with the task of securing the academic foundation and improving the academic standards of Japan, with a focus on academic research. The essence of university-level academic research is to give rise to new and richly creative knowledge based on liberal and open ideas, and the independent research activity of researchers. Furthermore, university-level academic research shall be characterized by the goal of advancement in study carried out over a broad range of fields in the areas of humanities, social sciences, and natural sciences, shall possess a respect for the independent nature of researchers as being essential to such progress, and shall function for the integrated promotion of research and education.

Based on reports and suggestions forwarded by the Science Council, the Ministry of Education, Culture, Sports, Science and Technology strives to provide for Japan's foundation for academic research in a planned and prioritized manner, and to proactively implement a comprehensive policy for the nation by increasing research funding, improving research facilities and equipment at universities and inter-university research institutes, nurturing and recruiting exceptional researchers, prioritizing the promotion of basic research, forming COEs, improving the evaluation of research, and developing and expanding upon the science information infrastructure, in order to develop an academic research system that is open to the world, and which is capable of flexibly responding to advancements in scientific research.

Expanding the independence of management in the areas of budget, organization and personnel affairs, national universities and inter-university research institutes were incorporated under the National University Corporation Law (Law No. 112 of 2003) in April 2004 so that they could develop themselves as appealing ones with distinctive identities that actively address education, research, and contributions to society, and establish management structures that are open to public scrutiny.

Furthermore, a national project primarily led by the Cabinet Office has been undertaken to establish a graduate university of science and technology, which has the best-in-the-world quality, in Onna, Village of Okinawa. The basic concepts of the future university will be "internationality" and "flexibility," and the aim of this project is to contribute to Japan's and the world's scientific and technological advances, and to develop Okinawa into a center of intelligence in the Asia-Pacific region. In September 2005, the Okinawa Institute of Science and Technology Promotion Corporation was established to prepare for the establishment of the graduate university.

●Academic research at universities and inter-university research institutes

Academic research in Japan is conducted at undergraduate departments, graduate course, research laboratories and research facilities at universities, as well as joint-use inter-university research institutes, without being tied to a specific university.

Research laboratories devoted to research in designated specialized fields have also been established at universities. These research laboratories carry out specialized research in collaboration with education and research carried out at university departments and graduate schools. At the end of FY2005, a total of 59 research laboratories had been established at the national universities, including 20 research institutions for joint use for the nation's universities. Research projects such as neutrino research conducted by the Institute for Cosmic Ray Research (ICRR) of the University of Tokyo have produced research results of the highest international standards.

Sixteen existing institutes were reorganized into four organizations (National Institutes for the Humanities, National Institutes of Natural Sciences, High Energy Accelerator Research Organization, and Research Organization of Information and Systems) with corporatization of National Universities in FY 2004, but the inter-university research institutes continue making significant contributions to research advancements in a variety of fields by acting as centers for promoting joint research between researchers employed throughout the nation's universities, and by providing a place for the joint use

of facilities, equipment, and materials that are unique or large in scale. Projects such as the B-Factory project of the High Energy Accelerator Research Organization (KEK) and SUBARU, an optical-infrared telescope, a project of the National Astronomical Observatory of Japan (NAOJ) also promote cutting-edge international research. In addition, each organization is making efforts to create new sectors beyond the framework of existing organizations and sectors by establishing collaborative organizations and facilitating exchanges of researchers in different sectors.

Starting in April 2004, budgets for national universities and inter-university research institutes are allotted as subsidies for operating costs without their use being specified. Moreover, after incorporation, individual corporations are allowed to reorganize and abolish their organizations by their own judgment, giving them a more flexible approach to engaging in research activities. Furthermore, a "special education research expense" has been established to give prioritized support to corporations engaged in characteristic and ambitious research programs, making necessary financial support available for strategic, international, and contributing to local communities research activities proposed or requested by each corporation.

●Expanding support for Japan's private universities

Roughly 75 percent of Japan's university students attend private universities, which actively carry out characteristic educational research activity based on the unique spirit upon which each university was created. Accordingly, the Ministry of Education, Culture, Sports, Science and Technology implements the following measures in order to support private universities.

With the aim of creating world-class universities, the Ministry is providing prioritized assistance according to the state of each university's efforts in education and research under "Special Expenses for Advancing Higher Education and Research Levels at Private Universities," a subsidy for operational costs.

To assist in the development of facilities and equipment, the Ministry supports the remodeling of facilities to make them multimedia-capable, the installation of on-campus LAN systems, and the comprehensive provision of the research facilities and equipment needed to implement excellent research projects selected by the "Program for Promoting the Advancement of Academic Research at Private Universities."

As for tax measures, various tax incentives including the exemption of corporation income tax and enterprise tax related to education and research projects are provided. To develop the conditions for inducing diversified private-sector funds into school corporations, tax systems concerning donation to educational corporations were changed, and the minimum limitation for deductions for donations under income tax was lowered from 10,000 yen to 5,000 yen for donations conducted after 2006.

●Deliberations in the Council for Science and Technology

The Council for Science and Technology conducts research and deliberations in response to inquiries posed by the Ministry of Education, Culture, Sports, Science and Technology regarding matters important to the comprehensive promotion of science and technology, and to the promotion of learning in general; it also provides opinions to the minister. The Subdivision on Science was established within the Council in order to conduct research and deliberations on matters important to the promotion of learning that takes place primarily at universities (see Table 3-1-6).

(2) Science Council of Japan (SCJ)

The Science Council of Japan represents Japanese scientists at home and abroad with the philosophy that science is the foundation upon which civilized nations are built. Its purpose is to promote the advancement and development of science and have it reflected and spread in administration, industry and national life. The SCJ was established as the "special organization" under the jurisdiction of the Prime Minister in January 1949. It is now organized by 210 members representing about 790,000 scientists of Japan, and independently conducting activities with the following duties: (1) the deliberation and implementation of important matters concerning science, (2) the promotion of liaison for research concerning science, and improvement of efficiency.

In April 2004, the "Law to Amend Part of the Science Council of Japan," which is designed to revise SCJ's jurisdiction, organization, and way o

recommending members, etc., was enacted. The Science Council of Japan was then placed under the authority of the Cabinet Office in April 2005 and its new organization was inaugurated after implementing operational reforms.

In order to contribute to the promotion of Japanese science and technology in close cooperation with the Council for Science and Technology Policy, the new Science Council of Japan is proceeding with activities with its emphasis on the following:

1) Policy recommendation

Propose to policy decision makers specialized and reliable recommendations and advice from the viewpoint of scientists

2) Liaison and coordination concerning scientists

Establish a close network among scientists through the promotion of scientists' exchanges and strengthening coordination and cooperation in scientists' communities.

3) International exchanges concerning science

Establish an international structure for cooperation among scientists under which scientists around the world can make recommendations on global issues on the basis of scientific knowledge.

4) Develop public opinions for science, and strive to promote the scientific capabilities of youth

Especially through efforts of members of the Science Council of Japan to have a dialogue with society to talk about the significance of science and research in an easy-to-understand language.

●Deliberation activities

In April 2005, the President of the SCJ submitted to the Prime Minister the "Japan Vision 2050 (Principles of Strategic Science and Technology Policy Toward 2020" as the SCJ's statement with regard to what the Japanese policy on science and technology should be in the future. The proposal by 2050 called on realizing the establishment of the "Nation with Dignity," and "Trust of Asia" as Japan's national vision, and set up missions.

Based on the "Japan Vision 2050 (Principles of Strategic Science and Technology Policy Toward 2020," the President of the SCJ made recommendations to the Prime Minister on the "Counsel on ensuring the safety in time of earthquake disaster in megacities," which is one of the most urgent issues in April 2005.

The SCJ made one recommendation, 7 requests and statements, and 68 external reports in FY2005.

●International scientific exchange

The SCJ represents Japan through its affiliation with 48 international scientific organizations, including the International Council for Science (ICSU) and the InterAcademy Council (IAC). It has been striving for cooperation with various countries by actively taking part in six international academic cooperative projects, including the International Geosphere-Biosphere Programme (IGBP).

Especially, science councils from the Group of Eight countries including the SCJ agreed to issue a joint recommendation (joint statement) concerning the agenda of the annual G8 Summit, and to work for the establishment of a framework under which representatives of G8 science councils will gather at the Summit venue for discussions. Activities of the G8 science councils started in 2005. In June 2005, prior to the G8 Summit held at Gleneagles, UK in July, science councils of the G8 and other related countries issued a joint statement concerning the main agenda of the Summit: the "climate changes" and the "African development."

The Science Council of Asia (SCA), an international scientific organization which aims to promote collaboration and cooperation among Asian countries in scientific research, convened annually on the theme of sustainable development in Asia. The SCJ serves as secretariat for the SCA, and member countries host its conference in rotation. The fifth conference was held in Vietnam in May 2005.

In September 2005, the SCJ hosted the "International Conference on Science and Technology for Sustainability–Dynamism and Uncertainty in Asia" in Kyoto. The conference adopted a chairman's statement which included topics which scientists should take on the challenge of on the basis of in-depth deliberations on harmony between economy and the environment.

The Science Council of Japan also obtains approval from the Cabinet to host important international conferences related to science. These conferences are held in Japan and jointly hosted with relevant scientific research organizations. In FY2005, the Council co-hosted eight such conferences, including the 18th World Conference of Psychosomatic Medicine.

●Open lectures and symposiums

The SCJ sponsors open lectures as a way of returning science results to the citizens of Japan. The SCJ also actively sponsors symposiums that engage in various scientific issues. The Divisions and Disciplinary Committees of the SCJ play a central role in organizing such symposiums in cooperation with various academic institutions.

In FY2005, the SCJ hosted three open lectures and 107 symposiums.

Furthermore, the SCJ jointly hosted with the Cabinet Office and Nippon Keidanren (Japan Business Federation) the "Fourth Conference on the Promotion of Coordination between industry, academia and government" in Kyoto in June 2005, and the "Fifth Summit on Coordination between industry, academia and government" in Tokyo in November 2005, in order to promote collaboration between industry, academia, and government. The SCJ also hosted a "Regional Promotion Forum" in Sapporo in September 2005, and in Kanazawa in March 2006.

●Building a network of scientists

The Science Council of Japan gathers scientists' opinions in both humanities and natural sciences as the central community for Japanese scientists. The SCJ conducts operations for liaison and coordination with related research institutes and study groups while grasping the academic movements, and studying the future planning and the development of research conditions. The SCJ is collaborating with about 1,200 academic institutions with the status of SCJ academic partners.

For the purpose of enhancing communications with regional scientists and contributing to the promotion of science, the SCJ organizes 7 regional conferences in Hokkaido and Tohoku, Kanto, Chubu, Kinki, Chugoku and Shikoku, Kyushu and Okinawa.

(3) National Experimental Research Institutions, Public Experimental Research Institutions, and Incorporated Administrative Agencies

National experimental research institutions, incorporated administrative agencies, and public experimental research institutions are assigned the task of achieving policy targets. It is critical for these organizations to carry out prioritized research and development that centers on basic, pace-setting research to improve the nation's science and technology levels. They should also carry out systematic and integrated research that sets concrete targets in line with policy needs. Public experimental research institutions that belong to local governments shoulder the responsibility for carrying out technical development, and providing technical guidance that meets the needs of local industry and their region.

The total FY2005 expenditure related to science and technology, which cover experimental research, personnel, and facilities expenditures for the national experimental research institutions (including the Geographical Survey Institute, the National Geography Institute, the Japan Coast Guard's Hydrographic and Oceanographic Department, and other institutes), incorporated administrative agencies, and public research institutions, was 1.3626 trillion yen.

(4) Private Sector Research and Development

It is critical for the nation to reinvigorate the research and development activities of the private sector, which play an important role together with the activities of the national government. Therefore, it is important for the national government to increase the drive for a broad range of private sector research and development activities, based on the fundamental concept of self-reliance among the private sector.

●Promoting private sector research activity through the taxation system

To promote research and development by the private sector, various tax measures are provided as shown in Table 3-3-5. An existing tax system gives a tax credit on a certain percentage of gross experimental and research expenses. In the FY2006 tax reform, special measures are added for two years by which the credit percentage is increased for an increase in experimental and research expenses. As another measure, the non-deductible amount of deduction for donations under the income tax decreased to 5,000 yen.

Table 3-3-5 Major preferential treatment for science and technology promotion

Item	Purpose	Description	Applicable law	Date of enactment/ validity
R&D taxation system	Promotion of research and development investment by the private sector, etc.	Tax Credit for research and development expenditures I. Proportional Tax Credits for total research and development expenses (1) The research and development credit is a percentage (8 to 10%) of the total of research and development expenses. The maximum amount is the sum of 20% of the corporation tax liability (2) Same for individual businesses (Income tax) II. Special Tax Credit on joint and entrusted research based on industry-academic-government cooperation (1) For joint research and development with, or research and development commissioned to, universities and public research institutes (including independent administrative institutions), consistent with item I above, the tax credit amount is a value equivalent to 12% of these research and development expenses (but limited to a value equivalent to 20% of corporation tax with the special tax credit from item I. above added in). (corporation tax) (2) Same for individual businesses (Income tax).	Special Taxation Measures Law, Article 10 (income tax), Article 42-4, Article 68-9 (corporation tax), Local Tax Law, Supplementary Provision, Article 8, Item 1.	Enacted in FY2003
		III. Tax system to strengthen the technical base of small and medium-sized corporations (Applied instead of I or II) (1) The tax credit amount is a value equivalent to 12% of test and research expenses at small and medium-size corporations (but limited to a value equivalent to 20% of corporation tax) (corporation tax). (2) Same for individual businesses (Income tax) (3) The tax credit amount in (1) above is excluded from the tax base for corporate inhabitants tax (Local tax).		Enacted in FY1985
		IV. Proportional Tax Credits for increased research and development expenses (1) The research credit is 5% of the excess of research expenses over the base amount provided that the base amount in I or Ⅲ exceeds the average of annual research expenses for the previous three business years and the annual research and development expenses for the previous two business years (but limited to a value equivalent to 20% of the corporation tax). (corporation tax) (2) Same for individual businesses (Income tax).		Enacted in FY 2006 (effective through FY2007)
Deductions for Donations, etc	Promotion of science and technology	1) The following donations made by individuals or corporations shall be given preferential treatment: 1. Donations to public interest corporations that are designated by the Finance Minister as being publicly solicited, contributing to the promotion of education or sci-	Corporation Tax Law, Article 37 Income Tax Law, Article 78 Special Taxation Measures Law, Article 40	Enacted in FY1946 (corporation tax), Enacted FY1962 (income tax) Enacted FY1961 (corporation tax), Enacted FY1962

Item	Purpose	Description	Applicable law	Date of enactment/ validity
		ence, and assuredly going to urgent causes (Designated donations) 2. Donations to public interest corporations that promote education or science, significantly contribute to the public interest, and are donated to specified, qualified public-benefit promotion institution in relation to the main activities of the corporation; 3. Donations to specified approved charitable trusts that receive approval of the competent minister as promoting education or science, significantly contributing to the public interest, and filling specified requirements. (2) With regard to donations of spot goods to corporations engaged in businesses in the public interest, and that receive approval of the Director-General of the National Tax Administration Agency as filling the requirements of promoting education or science.		(income tax) Enacted in FY1987 Approval procedure streamlined in FY2003 Tax deduction limitation increased in FY2005 Minimum allowable donation lowered in FY2006
Measures for Tax Exemptions on Research Assets of Scientific Research Corporations	Promotion of science and technology	Assets provided to corporations established under Civil Law Article 34 for the purpose of scientific research are exempted from the real property acquisition tax, fixed property tax, special land holding tax, and city planning tax, subject to their direct use in that research.	Local Tax Law, Article 73-4, Item 1, Article 348, Item 2, Article 586, Item 2, Article 702-2, Item 2	Fixed property tax in 1951, real property acquisition tax in 1954, city planning tax in FY1956, special land holding tax in FY1973
Special Measures for Property Taxation Standards related to Biotechnology Research Assets	Reduction of burdens related to prevention of danger and harm to the public	Of the equipment that is required for experiments and research in gene recombination technologies, etc., the tax base for the purpose of fixed property tax is reduced to five-sixth for three fiscal years for new equipment that is acquired for the purpose of taking nonproliferation measures in accordance with the "Law Concerning the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms."	Local Tax Law Supplementary Provisions, Article 15, Item 19	Enacted in FY1986, effective through FY2007
Tax system for Promotion of Research Exchanges	Promotion of research exchanges, and revitalization of local economies	When corporations subject to Article 34 of the Civil Law develop facilities on the grounds of incorporated national universities for joint research with those incorporated national universities or incorporated inter-university research institutes, the tax on real property acquisitions is reduced to one-half, while the tax base for the fixed property tax is reduced to one-half for the first five years after acquisition, and to three-fourths for the succeeding five years.	Local Tax Law Supplementary Provisions, Article 11, Item 14, and Article 15, Item 21	Enacted in FY1999 (real property acquisition tax), enacted in FY2000 (fixed property tax) (effective through FY2006)

●Promoting private sector research activities through investment and loans

To promote research activity in the private sector, fiscal investment and loan systems for technology development are implemented by various government-affiliated organizations. The following section introduces some of the main examples of this.

1) National Agriculture and Bio-oriented Research Organization

With the aim of promoting experimental research in the private sector concerning the designated industrial technology of biological systems, The National Agriculture and Bio-oriented Research Organization provided funds and conditional interest-free loans, as well as referrals for joint research using investments and financing from the Industry Investment Special Account and investments from private sources.

2) Other financial provisions

To ensure the development of new technologies recognized as being able to contribute to a major improvement in the level of Japan's industrial technology, the Development Bank of Japan is implementing the New Technology Research and Development Loan Program to provide long-term, fixed, low-interest loans to corporations for development costs related to new technologies.

●Promotion of private sector research activities through subsidies

A system of subsidies is made available to support research and development aimed at commercialization by the private sector. The main subsidies are as follows:

1) Subsidies for Pharmaceuticals to Treat Rare Diseases

To support research and development on drugs, etc., for diseases that afflict small numbers of Japanese people, subsidies are provided for costs related to experimental research for applicable pharmaceuticals, etc.

2) Support Technology Development Project for the Creation of Collective Private Agribusiness

In order to stimulate agribusiness, support is given for research and development that utilizes the potential of universities and incorporated administrative agencies, and is conducted by private-sector enterprises that assume the task of turning research results into practical applications.

3) Project to Support Research and Development for Revitalization of Regional Food Industry, etc.

Support is given to short-term research and development conducted by private enterprises concerning issues to be urgently solved at worksites of agriculture, forestry and fisheries industries, and the food industry including the food-related industry.

4) Program for the Support of Research on the Integration of Different Fields for the Creation of Bio-oriented Industries

Orchestrating the R&D ability of industry, academia, and the government, integrative research conducted by researchers from different fields is implemented with an open invitation for proposals from the public, and support for the building of partnerships is given.

5) Subsidies for Research and Development of Creative Technologies

From the perspective of technology development and improving the technological capabilities of small and medium-scale enterprises, subsidies are provided for costs related to the development of creative new products, and the research and development of new technologies.

6) Subsidies for Cutting Edge Technology Research and Development

The National Institute of Information and Communications Technology (NICT) subsidizes the research and development costs for venture enterprises carrying out cutting edge R&D related to telecommunications technologies that will lead to the creation of new business in the future.

7) Subsidies for Research and Development into the Improvement of Communication and Broadcast Services for Elderly and Disabled People

The NICT provides private sector corporations, etc., with subsidies for research and development costs necessary for the development of communication and broadcast services for the elderly and disabled.

8) Program for Subsidy of Technology Development for Creation of New Regional Industries

In order to revitalize regional economies through the creation of new regional industries/businesses, support is given to high-risk development technology for practical use, such as entry into new fields by small and medium-sized enterprises and start-ups by venture companies.

9) Private Sector Fundamental Technology Research Support Scheme

In order to promote experimental research into infrastructure technologies conducted in the private sector related to the mining, manufacturing, electro-communications and broadcasting industries, public applications are invited for entrustment research contracts. Applications are accepted by the New Energy and Industrial Technology Development Organization for mining and manufacturing technologies, and by the NICT for communications and broadcasting technologies.

10) Grants for Practical Application of Industrial Technology

To strengthen industrial technology in the private sector, the New Energy and Industrial Technology Development Organization (NEDO) provides financial support on a cost-sharing basis to private sector enterprises for development of practical new technologies aimed at creating new markets or responding to social needs.

11) Subsidies and consignment expenses, etc., conducted under the Small Business Innovation Program

This program is described under the section entitled, "3.3.2.4, Developing an Environment to Invigorate Research and Development-style Ventures."

12) Project to Support Research for Putting Medical Products and Medical Equipment to Practical Use

Private enterprises engaged in practical use-stage research and development of technologies concerning medical products and medical equipment useful for the enhancement of health care are invited to apply for entrustment research contracts through the Pharmaceuticals and Medical Devices Agency.

●Other

A number of measures are being implemented to ensure the availability of superior personnel in small businesses, venture businesses, and other corporations that have just started operating. These measures include the promotion of personnel exchanges between universities and industry, etc., in order to nurture and produce personnel with an entrepreneurial sprit, to implement model research for courses offered on leading entrepreneurship at universities, etc., to further promote internships at venture businesses, etc. (student enterprise experience program), and to encourage university graduates to go into venture business operations.

Additionally, to support the creation of new businesses through entrepreneurial activities within corporations or through corporate spin-offs, a share conversion and share transfer program is being implemented to ensure the smooth reform of corporate organizations through the use of corporate spin-offs and holding companies, etc. In addition, studies have commenced into the development of a legal system for breaking up companies.

In addition, when preparation by the private sector is difficult because of the need for large-scale and joint-use facilities, the national government is prepared to undertake the preparation of facilities and equipment for joint use with the private sector (Table 3-3-6).

Table 3-3-6 Development of large-scale and expensive joint-use facilities and equipment too difficult for the private sector

Ministry or agency	FY of first use	Facility name / Summary of facility or equipment	No. of cases for private-sector use (Unit: No. of cases)									
			FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
Ministry of Internal Affairs and Communications	2001	Iwate IT Open Laboratory	–	–	–	–	–	–	8	11	14	17
		Honjo R&D Support Center for Telecommunications	–	–	–	–	–	19	19	17	16	24
		Hokuriku IT Open Laboratory	–	–	–	–	–	–	29	21	32	31
		Kitakyushu IT Open Laboratory	–	–	–	–	–	–	12	16	17	16
		Shared use research facilities were developed and established by the National Institute of Information and Communications Technology (NICT) with the aim of the advancement of local industrial structure by the acceleration of research and development in industry-academia and by the accumulation of research institutes in university areas.										
Ministry of Education, Culture, Sports, Science and Technology	1996	Numerical Space Engine	1	4	2	0	0	0	0	0	0	0
		Supercomputer and various servers										
	1997	Snow and Ice Disaster Prevention Test Facility	–	1	3	0	3	6	6	8	8	7
		Completed March 1997. Total construction costs: 1.4 billion yen.										
		Two snow-making devices can generate two types of falling snow, the crystalline and globular types. Also equipped with rainfall, sunshine, and wind tunnel devices, to recreate all possible snow and ice phenomena.										
		Low-temperature test facility: Temperature –35℃ to 25℃										
		Base area: 25m × 7m										
	1997	Synchrotron Radiation Facility (SPring-8)	–	5	14	26	50	62	100	115	139	219
		The facility constructed by RIKEN is designed for research in a wide range of disciplines using synchrotron radiation that is emitted from an electron traveling at almost the speed of light when its path is bent by a magnetic field. The Japan Synchrotron Radiation Research Institute (JASRI), which was designated by law as the Organization for the Promotion of Synchrotron Radiation Research, has conducted facility management and has striven to promote its public use.										
	1997	The facility constructed by RIKEN is designed for research in a wide range of disciplines using synchrotron radiation that is emitted from an electron traveling at almost the speed of light when its path is bent by a magnetic field. The Japan Synchrotron Radiation Research Institute (JASRI), which was designated by law as the Organization for the Promotion of Synchrotron Radiation Research, has conducted facility management and has striven to promote its public use.	–	0	1	0	0	0	0	0	0	0
		At 80 meters in length, the world's largest free-piston shock tunnel. Maximum pressure 150Mpa, maximum entropy 25MJ/kg.										
	1998	Ultra-Strong Magnetic Field Generating Device (powerful field magnet)	16	16	62	73	70	68	83	86	85	94
		An advanced facility that uses a world–class 40–ton hybrid magnet and various other magnets for study into magnetic field strength, special expansion, precision, and stability, in order to conduct measurements into electronic properties, material properties, etc.										
	2005	Full size three-dimensional vibration destruction facility (E-Defense)	–	–	–	–	–	–	–	–	–	0
		World's largest shaking table (Size: 15m x 20m, Payload: 1,200 t) used in figuring out destruction mechanisms and verifying earthquake resistant/reinforcement by destroying full-scale structures for the purpose of reducing damages by earthquake.										
Ministry of Agriculture, Forestry, and Fisheries	1996	Building for engineering experiments related to earthquake resistance and comfortable wood construction	–	1	2	1	1	0	0	1	2	1
		Test facility for seismic resistance of wood structures: Reaction floor, Reaction wall, Actuators (2 units of 300KN, 2 units of 200KN, and 4 units of 100KN)										
Ministry of Land, Infrastructure and Transport	1997	Large-scaled three-dimensional shaking table	–	0	0	1	1	1	1	1	14	16
		Shaking experimental facility used in investigation of the behavior at earthquakes of ground/structure to reproduce large-scale earthquake motions (Example: Hyogoken-Nanbu Earthquake, Mid Niigata Prefecture Earthquake). (Size: 8m x 8m, Payload: 300tf, Maximum acceleration: ±2G, Maximum horizontal displacement: ±60cm, Vertical: ±30cm)										
	1999	Aqua Restoration Research Center	–	–	–	5	3	0	2	1	0	0
		Researches the preservation of river and marshland ecologies, for the purpose of research and development that facilitates mankind's coexistence with nature.										

3.3.2 Strengthening of Industrial Technology and Reform of the Structure for Coordination between Industry, Academia, and Government

3.3.2.1 Promoting Commercialization for the Practical Use of Research Results Achieved by Public Research Institutions

(1) Introduction

●Promotion of cooperation among industry, academia, and government

The 21st century is being referred to as the "century of knowledge." The creation and utilization of that knowledge is indispensable to Japan's future development, for which the cooperation among industry, academia, and government is an important effort. Cooperation among industry, academia, and government in Japan has made great progress recently. For instance, the number of joint research projects between National Universities, etc. and industry has more than doubled in the last five years. In FY 2004, 223 patent licenses had been secured. In the past three years, over 490 university-based venture companies have been created. As of August 2005, there were 1,141 such venture companies. At the same time, however, the acquisition and execution of patents in Japan is not always sufficient, given the world-class R&D capabilities of Japanese universities. Future cooperation among industry, academia, and government must be promoted further, for which various efforts are being strengthened.

(2) Promoting Commercialization for the Practical Use of Research Results Achieved by Public Research Institutions

To encourage the practical use of research and development results obtained at universities, research institutions, etc., the JST offers a series of comprehensive programs covering the identification of exceptional research results, support for patent applications, and support for the commercial development of research results that are difficult to commercialize. The JST actively supports the patenting of research results obtained at universities, public research institutions and Technology Licensing Organizations (note1), as well as other technology transfer endeavors, and also runs the Technology Transfer Support Center, which is responsible for foundational work related to these activities, including the education of human resources and comprehensive consulting on technology transfer issues. The JST also promotes the following efforts based on the research results of universities and public research institutions: the implementation of a test to secure applied patents helpful for achieving practical use of fundamental patents; the modeling of new technology concepts from R&D-oriented medium-and small-scale enterprises; and the formation of venture corporations stemming from universities and public research institutions through the promotion of R&D aimed at the creation of new industries. Furthermore, in collaboration with universities, public research institutions, and TLOs, the JST provides development referrals for, and help with, licensing research results. For the development of new technologies considered likely to involve high development risk, JST assists companies developing applications for practical use by providing Risk-Taking Funds (if the development is unsuccessful, there is no requirement for repayment).

The Ministry of Education, Culture, Sports, Science and Technology supports university researchers who are attempting R&D that links basic research and research for product development—a stage of R&D that has insufficient support and is nicknamed "death valley." The Ministry targets researchers whose research results can be expected to lead to entrepreneurial activities in the future, and subsidizes their R&D expenses and the management expenses for preparing a business plan toward the establishment of a business. As of the end of March 2005, MEXT has also placed 104 coordinators in 80 universities and technical colleges nationwide, where they serve as bridges between universities and enterprises that are conducting joint research at the universities. Furthermore, MEXT has been promoting the opening of special continuing education courses at universities and educational institutions to create human resources that turn research results into businesses after determining the nature of technology (Management of Technology or MOT) (note) and those that are ex-

perts in intellectual property. To foster human resources that are well versed in the securing and utilization of intellectual property, since FY2002, MEXT itself has been training human resources that will perform specialized jobs in the future at research locations, and equipping them with special knowledge about the securing and utilization of intellectual property as part of the "Fostering Talent in Emergent Research Fields," program, which is supported with Special Coordination Funds for Promoting Science and Technology.

At RIKEN, in order to facilitate more efficient application of research results to practical use or technology transfer, a new system has been established. Under this system, researchers in RIKEN who have established venture companies on their own are given preferential treatment in their joint research with those venture companies.

The Ministry of Agriculture, Forestry and Fisheries supports activities of the TLOs approved by the Minister of Agriculture, Forestry and Fisheries, and is implementing a Technology Results Transfer Promotion Program for the practical application of research results of Incorporated Administrative Agencies for Experimental Research by industries.

The Ministry of Economy, Trade and Industry helps translate university research results into businesses through implementation of the Practical Application Research and Development Program for University-based Business Creation, which supports joint research by making matches between industry and academia with the objective of creating practical applications, and through the Dispatch of Management Experts Program for university-based start-ups. Aiming at the creation of 10,000 MOT personnel, since FY2002, METI has also been promoting the improvement of environments for the cultivation of MOT human resources. It does this by supporting the development of curricula and educational materials needed to cultivate MOT personnel at a total of 148 educational institutions such as universities.

In order to provide the appropriate protection of research results at national and public experimental research institutions and universities, and to support the smooth transfer of research results to industry, the Patent Agency hosts patent promotion fairs to provide opportunities for interaction with industries interested in adopting technologies. These fairs were implemented in 9 cities nationwide in FY2005. In addition, the National Center for Industrial Property Information and Training dispatches, as of the end of February 2005, patent promotion advisors to 33 of the 41 approved TLOs that are currently in operation.

In addition, the Patent Agency sponsors international patent promotion seminars for a broad range of researchers and students from universities and public research institutions, which bring together large groups of individuals who are experts in the transfer of technology both in Japan and abroad. The Patent Agency also implements basic and practical training on patent promotion and technology transfer necessary to promote the transfer of research results to industry.

The National Institute of Advanced Industrial Science and Technology inaugurated 18 venture companies in FY2005 to develop new industries and markets by utilizing their own technology seeds, eased regulations on side businesses, and enhanced support for intellectual property rights.

3.3.2.2 Developing an Environment for the Transfer of Technology from Public Research Institutions to Industry

With the aim of realizing a "nation built on intellectual property," the "Basic Law on Intellectual Property" was established in 2002 and various efforts are being made by the whole government to realize the "Intellectual Property Strategic Program" based on the Law.

Public research institutions must clarify the responsibility of institutions and researchers to explain to society the content and results of their research, and must give importance to intellectual property as well as research papers as performance evaluation of their researchers. Currently, the institutions are promoting that patents are to be attributed to the research institutions in principle, in line with proposals in the Basic Plan. Accordingly, the number of preferential licenses extended to private sector organizations resulting from patents obtained through joint research between national experimental research institutions and private sector organizations has increased with every passing year.

In line with the shift of attribution of patent and other university research results from individuals in principle to institutions in principle, the Ministry of

Education, Culture, Sports, Science and Technology has established the Research Organization of Information and Systems (43 organizations) and has been providing support since FY2003 in order to establish a strategic management system for control and utilization of intellectual property, such as patents, produced by universities. (Figure 3-3-7) Moreover, to promote strategic foreign patent procurement originated from university research, the JST is supporting the related costs (the Technology Transfer Support Center).

Based on the Law for Promoting University-Industry Technology Transfer (Law No. 52, 1998), 41 TLOs were approved at the end of March 2006. The number of secured patent licenses was 1,863 as of the end of March 2005. (Figure 3-3-8, 3-3-9).

To support TLO activities, the Ministry of Economy, Trade and Industry started issuing subsidies to TLOs in 1999 following the enforcement of the Law for Promoting University-Industry Technology Transfer. In response to the large burden that foreign patent applications are having on TLOs, METI started in FY2003 to help cover foreign application costs with expanded subsidies.

Furthermore, METI drew up the "Guidelines for preparing trade secret management policy at universities," to enable universities to manage trade secrets to an appropriate extent under their own judgment, and to facilitate smooth technology transfer of universities research results to industry. The guidelines are being made widely known to university-connected individuals.

The National University Incorporation Law (Law No. 112 of 2003) lists the "promotion of diffusion and utilization of research results" as one of the businesses of national universities, and made it possible that investment in approved TLOs will further promote a virtuous cycle of intellectual property and the return of research results to society. In line with this, Niigata University was allowed to invest in approved TLO (Niigata TLO Corporation) in March 2006.

Table 3-3-7 Regional distribution of university intellectual property centers under the improvement program

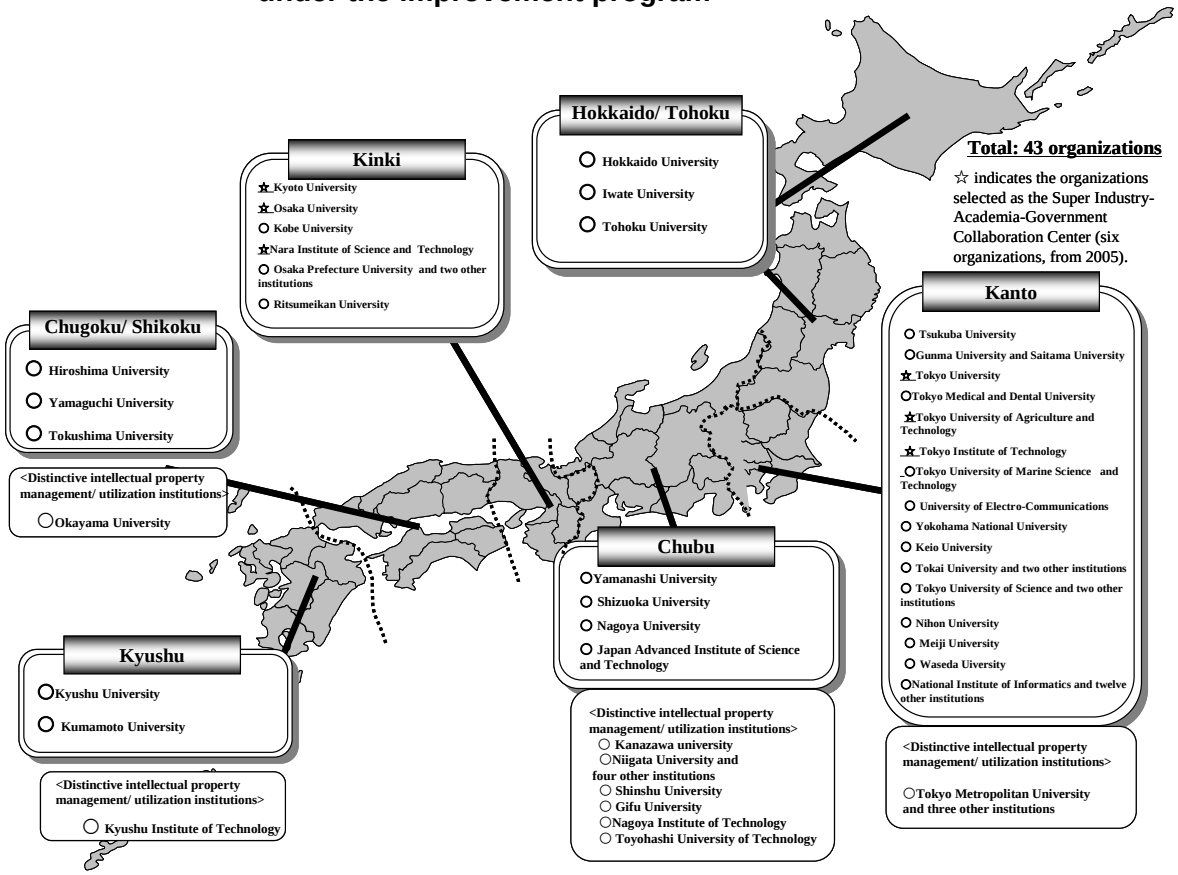
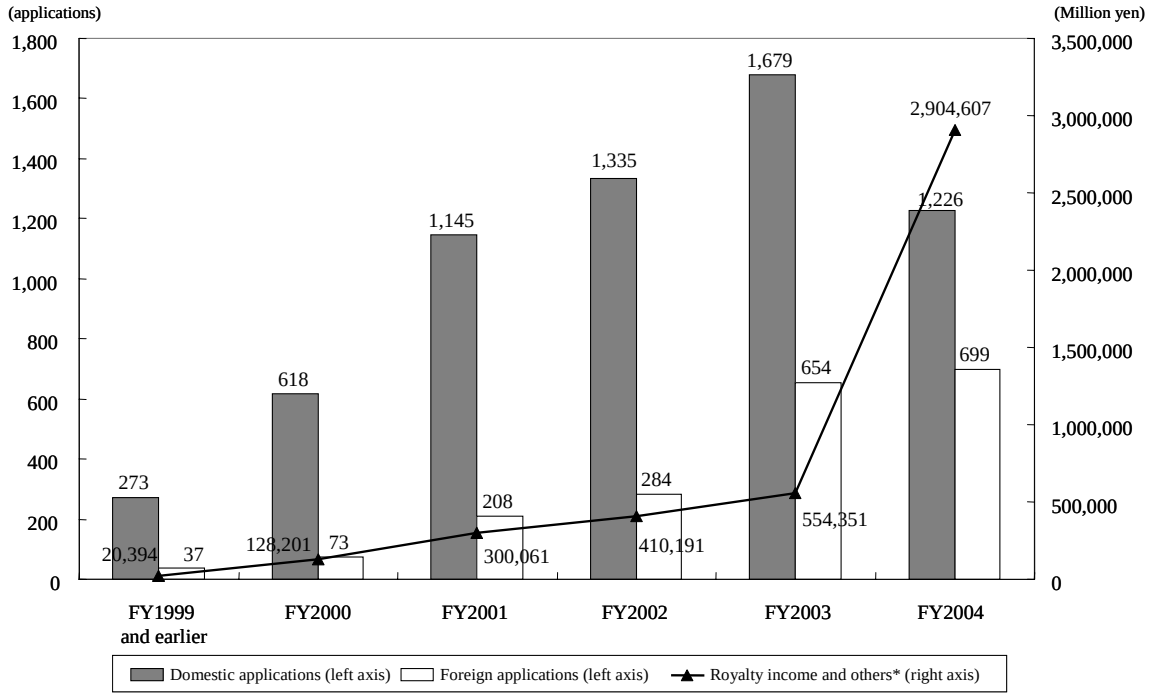


Table 3-3-8 Approved TLOs (Total of 41 institutions)

Name of TLO company	Date approved		Name of participating university
Hokkaido Technology Licensing Office Co., Ltd.	Approved	Dec. 24, 1999	Hokkaido University and other universities and colleges in Hokkaido
Tohoku Techno Arch Co., Ltd.	Approved	Dec.4, 1998	Tohoku University, other national universities, etc., in the Tohoku region
Institute of Tsukuba Liaison Co., Ltd.	Approved	Apr. 16, 1999	University of Tsukuba, others
Toudai TLO (CASTI)	Approved	Dec. 4, 1998	University of Tokyo
The Foundation for the Promotion of Industrial Science	Approved	Aug. 30, 2001	Institute of Industrial Sciences, University of Tokyo
Tokyo University of Agriculture and Technology TLO, Co. Ltd.	Approved	Dec. 10, 2001	Tokyo University of Agriculture and Technology
The Circle for the Promotion of Science and Engineering	Approved	Aug. 26, 1999	Tokyo Institute of Technology
Campus Create. Co., Ltd.	Approved	Feb. 19, 2003	The University of Electro-Communications
	Recognized	Feb. 19, 2003	
Technology Advanced Metropolitan Area Technology Licensing Organization	Approved	Dec. 4, 2000	Tokyo metropolitan area universities
Yokohama TLO Co., Ltd.	Approved	Apr. 25, 2001	Yokohama National University, Yokohama City University, and other universities and colleges in Kanagawa prefecture
Niigata Technology Licensing Organization Co., Ltd.	Approved	Dec. 25, 2001	Niigata University and other universities and colleges in Niigata prefecture
Omni Institute Corporation	Approved	Feb. 24, 2005	Nagaoka University of Technology, Nagaoka National College of Technology, University of Hyogo
KUTLO (Kanazawa University Technology Licensing Organization)	Approved	Dec. 26, 2002	Kanazawa University and other universities and colleges in Ishikawa prefecture and the Hokuriku region
Yamanashi Technology Licensing Organization Co., Ltd.	Approved	Sep. 21, 2000	Yamanashi University
SHINSHU Technology Licensing Organization	Approved	Apr. 18, 2003	Shinshu University, Nagano National College of Technology
Hamamatsu Foundation for Science and Technology PROMOTION	Approved	Jan. 17, 2002	Shizuoka University and other universities and colleges in Shizuoka prefecture
Nagoya Industrial Science Research institute (Chubu TLO)	Approved	Apr. 19, 2000	Nagoya University and other universities and colleges in the Chubu region
Toyohashi Campus Innovation Inc.	Approved	Sep. 5, 2005	Toyohashi University of Technology
Mie TLO (Mie Technology Llicensing Organization)	Approved	Apr. 16, 2002	Mie University and other universities and colleges in Mie prefecture
Kansai Technology Licensing Organization Co., Ltd.	Approved	Dec. 4, 1998	Universities and colleges in the Kansai region (Kyoto University, Ritsumeikan University, etc.)
	Recognized	Jul. 10, 2002	
Osaka Industrial Promotion Organization	Approved	Aug. 30, 2001	Osaka University and other universities and colleges in Osaka prefecture
New Industry Research Organization (TLO Hyogo)	Approved	Apr. 19, 2000	Kobe University and other universities and colleges in Hyogo prefecture
Okayama Prefecture Industrial Promotion Foundation	Approved	Apr. 28, 2004	Okayama University and other universities and colleges in Okayama prefecture
Hiroshima Industrial Promotion Organization	Approved	Oct. 09, 2003	Hiroshima University and other universities and colleges in Hiroshima prefecture
Yamaguchi Technology Licensing Organization Co., Ltd.	Approved	Dec. 9, 1999	Yamaguchi University
Techno Network Shikoku Co., LTD.	Approved	Apr. 25, 2001	Universities in the Shikoku region
Kyushu TLO Company, Ltd.	Approved	Apr. 19, 2000	Kyushu University
Kitakyushu Technology Center Co., LTD.	Approved	Apr. 1, 2002	Kyushu Institute of Technology and other universities and colleges in the Northern Kyushu region
Nagasaki Technology Licensing Organization	Approved	Oct. 15, 2004	Nagasaki University and other universities and colleges in Nagasaki prefecture
Kumamoto Technology and Industry Foundation	Approved	Aug. 30, 2001	Kumamoto University and other universities and colleges in Kumamoto prefecture
Oita Technology Licensing Organization, Ltd.	Approved	Aug. 26, 2003	Oita University and other universities and colleges in Oita prefecture
Miyazaki TLO	Approved	Mar. 16, 2003	University of Miyazaki and other universities and colleges in Miyazaki prefecture
Kagoshima Technology Licensing Organization Co., Ltd.	Approved	Feb. 19, 2003	Kagoshima University and other universities and colleges in Kagoshima prefecture
Keio University Intellectual Property Center	Approved	Aug. 26, 1999	Organizations on the Keio University campus
Tokyo Denki University Center for Research Collaboration	Approved	Jun. 14, 2000	Organizations on the Tokyo Denki University campus
RIDAI-SCITEC	Approved	Sep. 30, 2003	Organizations on the Tokyo University of Science campus
Nihon University Business, Research and Intellectual Property Center (NUBIC)	Approved	Dec. 4, 1998	Organizations on the Nihon University campus
NMS-TLO Center	Approved	Feb. 19, 2003	Organizations on the Nippon Medical School campus
Meiji University Intellectual Property Center	Approved	Apr. 25, 2001	Organizations on the Meiji University campus
Waseda University Intellectual Property Center	Approved	Apr. 16, 1999	Organizations on the Waseda University campus
Saga University TLO	Approved	Jul. 7, 2005	Organizations on the Saga University campus

February 2006: 41 institutions approved as TLOs, 2 institutions recognized as TLOs



*Proceeds from the equity include royalty incomes and others in FY2004.

Figure 3-3-9 Trend in approved TLO patent applications and royalty income

3.3.2.3 Reform of Structure for Disseminating Information and Research Exchanges Aimed at Strengthening Coordination among Industry, Academia, and Government

(1) Increasing the Dissemination of Information

To promote the strengthening of coordination among industry, academia, and government, it is essential to bring about a state of common recognition between industry and public research institutions, including universities. For this reason, public research institutions, including universities, are making research results available to the public and providing information in a number of ways, including the presentation of research results, the release of annual reports and other publications, the submission of research papers to various academic societies and journals, and the disclosure of government-owned patents.

The Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Economy, Trade and Industry, in cooperation with the Japan Science and Technology Agency and the New Energy and Industrial Technology Development Organization, sponsored "Innovation Japan 2005-University Fair," a nationwide industry-academic matching event to disseminate the intellectual property of universities and public research institutions in the field of the most-advanced technologies, such as nanotechnology/materials, health care/biotechnology, information/IT, environmental technologies and manufacturing technologies, to industries, etc.

Furthermore, to contribute to the creation of new industries, the Ministry of Education, Culture, Sports, Science and Technology utilizes the JST to compile databases covering a broad range of R&D support data and research results data for wide availability over the Internet. Specific examples are the Directory Database of Research and Development Activities (ReaD) that compiles organizational data, researcher data, research theme data and research resource data from public research institutions, including universities, and the JST Science and Technology Research Result Database for Enterprise Development (J-STORE) that brings together and processes research results from public research institutions, including universities, etc.,

related patent information, for presentation in a readily understandable technology resource format.

Based on the "Facilitating research information infrastructure and its utilization in various occasions" shown in the "Basic Plan for Agriculture, Forestry and Fisheries Research" drawn up in March 2005, the Ministry of Agriculture, Forestry and Fisheries carries out the digital conversion of research results and other information contributing to the technology development of the agriculture, forestry, and fisheries industries, for wide availability over the Internet. Specifically, this involves the preparation of the Agriculture Information Search System known as Agropedia[28], which integrates and serves as a centralized source for the digital full text information database of reports from the Ministry's experimental research incorporated administrative agencies, national and public experimental research institutions and the field of agriculture, forestry and fisheries in universities; domestic and international databases of agricultural literature; a database of meteorological satellite images, and a database of research topics being explored at experimental research institutions.

(2) Promotion of Research Exchanges

In recent years, research and development has increased in both sophistication and complexity, and has undergone an increase in the number of fields that are either interdisciplinary or are not included in any traditional discipline. To promote creative science and technology, it is critical to actively promote the development of infrastructures that allow such exchanges to be carried out, in order to promote personnel and material exchanges that extend beyond research institutions, and to efficiently and effectively utilize limited research resources. In addition, research exchanges are critical for the transfer of research results from public research institutions, including universities, to corporations, etc., and to encourage research by public research institutions, including universities, which reflects the needs of the corporations, etc.

●Joint research and contract research

The number of joint research projects between national universities and the private sector has steadily increased over time. The number of such projects including national, public and private universities exceeded 10,000 in FY2004 (Figure 1-2-30). Since the incorporation of national universities in April 2004 has made it possible for national universities to engage in flexible coordination between industry, academia and government activities in accordance with their individuality and characteristics, they are expected to further promote joint research and contract research programs.

Government ministries have implemented a number of measures to promote joint research through collaboration among industry, academia, and the government. Examples include the "Effective Promotion of Joint Research with Industry, Academia, and Government" program, with matching funds from the Special Coordination Fund for Promoting Science and Technology, newly begun in FY2002, and the "Project for Research Advancement in Agriculture, Forestry and Fisheries Utilizing Advanced Technologies" implemented by the Ministry of Agriculture, Forestry and Fisheries. In addition, the Ministry of Economy, Trade and Industry implemented the Practical Application Research and Development Program for University-based Business Creation…, promotion of coordination between industry, academia and government research through the most-advanced R&D test bed network established and operated by the National Institute of Information and Communications Technology the "Program for Industry-Academia
-Government Development of Advanced Technologies," within the "Program for Promoting Strategic Information and Communications Research and Development," … , The Ministry of the Environment utilizes the Global Environment Research Fund. The above programs serve to promote integrated project research through coordination among industry, academia, and the government.

[28] Agropedia: Derived from "Agriculture" and "Encyclopedia."

(3) Promotion of Personnel Exchanges

Currently, there are several programs in place to promote exchanges between researchers. Examples include the Government Guest Researcher Program implemented at various government ministries, and the Flexible Employment System for Research Personnel that promotes flexible and creative research activities by researchers at national experimental research institutions.

To bolster the reforms of the system of collaboration among industry, academia, and government laid down in the Basic Plan, in continuation from the previous year, the nationwide "Fifth Business-Academia-Government Collaboration Summit" was held in November 2005, sponsored by the Cabinet Office, the Ministry of Internal Affairs and Communications, the Ministry of Education, Culture, Sports, Science and Technology, the Ministry of Economy, Trade and Industry, the Japan Business Federation, and the Science Council of Japan. Taking "Study the Direction of New Development of Coordination between Industry, Academia and Government based on Pioneering Cases" as its theme, leaders of domestic universities and corporations were invited to the summit, and panel discussions were made. Participants adopted the "Fifth Business-Academia-Government Collaboration Summit," calling for aggressive promotion of the fostering and securing of human resources in science and technology, deepening of full-scale collaboration among industry, academia and government, and support for research results transfer, university reform, support for regional science and technology promotion, strategic protection and utilization of intellectual property, and expansion of the government's investment in research and development concerning science technology. In addition, in order to further promote collaboration among industry, academia, and government, the "Fourth Conference for the Promotion of Industry-Academia-Government Collaboration" was held in June 2005 and working-level consultations were held, and were attended by representatives of universities, research institutions, and TLOs. In the conference, outstanding examples of successful collaboration among industry, academia, and government that achieved remarkable success and contributed significantly to the promotion of such cooperative activities at universities and companies were recognized at the Third Awards Ceremony for Persons of Merit in Industry-AcademiaGovernment Collaboration, which included the presentation of the Prime Minister's Award, the Minister of Education, Culture, Sports, Science, and Technology Award, and other awards given by relevant hosts (Table 3-3-10).

The implementation of research activity for the private sector, etc., by researchers from national experimental research institutions and faculties at national universities, etc., contributes to the promotion of science and technology in Japan by cooperation among industry, academia and the public sector, and serves as an opportunity to demonstrate and build upon the individual capabilities of researchers. For this reason, it is necessary to manage the authorization of side jobs smoothly in which researchers employed by the national government are engaged in tasks such as research and guidance for the private sector, etc., outside of working hours. With regards to faculty members of national universities, they are allowed to engage in side jobs at the discretion of individual universities as the national university incorporation on April 1, 2004 has removed them from being employees subject to the National Civil Service Law.

Award for Persons of Merit in Industry-Academia-Government Collaboration in FY2005	
Award	Prize-winning example
Prime Minister's Award	Research on ubiquitous computing technology
Ministerial Science and Technology Policy Award	Development and practical application of cryo-TEM (cryogenic transmission electron microscope)
	Development of a short-culm strain of koshihikari
Minister of Internal Affairs and Communications Award	Water spray equipment using an extinguishing system to spray two-fluid mixture (water/air)
Minister of Education, Culture, Sports, Science, and Technology Award	Development of low power color reflective liquid crystal display devices
	Knowledge Cluster Initiative: Nagano/Ueda Smart Device Cluster
Minister of Economy, Trade and Industry Award	Research and development/practical application of ultra high density magnetic recording technology
	New industry creation by the advanced industry-academia-government collaboration organization model in Ritsumeikan University
Chairman of the Federation of Economic Organization Award	Research on superheated steam oven "Healsio"
Chairman of the Science Council of Japan Award	Development and clinical application of hospital-based microvessel imaging apparatus

Figure 3-3-10 Recognition of Persons of Merit in Industry-Academia-Government Collaboration (FY2005)

(4) Response to conflict of interest

In promoting coordination between industry, academia and government, it is extremely important to appropriately deal with any "conflict of interest" that may arise in universities and research institutions on a daily basis. Special prudence is especially required in "clinical study and clinical tests." For this reason, the Ministry of Education, Culture, Sports, Science and Technology held, in February 2006, the "Second Workshop on the Ethics of Clinical Study and Conflict of Interest." The workshop studied guidelines for each university to draw up conflict-of-interest policies and management rules concerning clinical study, and strived to promote the sharing of knowledge between universities.

(5) Promotion of Public Utilization of Research Facilities

There is no question that research activities of science technology depend on the creativity of researchers. In the cutting-edge fields, however, there are aspects in which both quality and quantity of research results are influenced by research facilities used by them. For this reason, such facilities play an important role in research activities.

Among others, the development of large research facilities in cutting-edge fields makes a major contribution to the development of science and technology, but at the same time it's crucial to make the most of these facilities in order to promote Japan's R&D as a whole and aim to advance the levels of science and technology. In this regard, the Second Science and Technology Basic Plan stated that the development and management of research facilities requires a large amount of expenditure, and the public utilization of the facilities will lead to the creation of world-highest level results." It is expected that public utilization of cutting-edge large research facilities by researchers in industry, academia and government in a wide range of science and technology fields will contribute to the creation of outstanding research results.

Based on the "Law for the Promotion of Public Utilization of the Specific Synchrotron Radiation Facility," the Ministry of Education, Culture, Sports, Science and Technology is striving to develop a

competitive environment for selecting users and research topics, and to enhance technical support to users as to Spring-8, the large synchrotron radiation facility with the world's best performance. In FY 2005, the Organization for the Promotion of Synchrotron Radiation Research adopted approximately 1,180 research proposals for implementation at the facility. Significant results were made so far in research such as "Electric Structures of Boron-doped Superconductivity Diamond," and the "Cubic Structure of Synthase which appropriately Prints Genetic Information to Proteins." Furthermore, MEXT revised the "Law for the Promotion of Public Utilization of the Specific Synchrotron Radiation Facility" in order to utilize the framework for facilitating the common use of SPring-8 which has been creating research results in an efficient and effective manner, and to seek further research results. Specifically, the "Law for the Promotion of Public Utilization of the Specific Advanced Large Research Facilities" was enacted in May 2006. The law aims to promote the fair and efficient use of the facilities, by listing under law SPring-8 and next generation super computers whose development will start in FY 2006 as cutting-edge large research facilities, and designating the Institute of Physical and Chemical Research (RIKEN) as the developer of super computers, and having registered organizations independent of the facilities' installer select and support their users.

In addition, the public use of large research facilities with high versatility owned by incorporated administrative agencies, etc., to the extent that their own missions are not disturbed, is also important to utilize Japan's R&D potential. However, there are some problems with these research facilities in that basic information concerning their use, such as location, use purpose, opening hours, etc., are not provided sufficiently, and user support systems on the side of the facilities are not yet developed. For this reason, the "Law for Facilitating Governmental Research Exchange" was revised in May 2006, by which the government (MEXT) provides related information for promoting the public utilization of these research facilities. To support users, the program of strategic utilization of advanced large research facilities has been implemented since FY2005, and efforts to develop a better user support system are being made in order to expand new users, mainly from industry for the Earth Simulator etc.

3.3.2.4 Developing an Environment to Invigorate Research and Development-style Ventures

The promotion of private-sector research and development and the utilization of R&D results within the national government, etc. have played an important role in revitalizing the economy.

In the Small Business Innovation Research Program (SBIR), the relevant government ministries and agencies coordinate to increase the opportunities to provide small and medium-sized enterprises and so forth with subsidies, etc. Subsidies, business commissioning fees and so forth that are intended for small and medium-sized enterprises for the development of new technologies leading to the creation of new industries are designated as "special subsidies" and are applicable to this program. In FY2005, seven government ministries, namely the Ministry of Internal Affairs and Communications, the Ministry of Education, Culture, Sports, Science and Technology, the Ministry of Health, Labour and Welfare, the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Economy, Trade and Industry, the Ministry of Land, Infrastructure and Transport, and the Ministry of the Environment designated a total of 58 subsidies as "special subsidies." A target amount of approximately 31 billion yen in funds was supplied to small and medium-sized enterprises, through the coordination and cooperation of the government ministries.

3.3.3 Promotion of Research Activities in Regional Areas

With increasing concerns over the hollowing out of industry, there is a growing need to promote science and technology at the regional level, in order to revitalize regional industry and to improve the quality of life for residents in regional areas.

The First Science and Technology Basic Plan stressed the importance of promoting research activities in regional areas, and called for the promotion of coordination and exchanges, etc., among local industries, academia, and governments, in accordance with the Basic Guidelines for Vitalization of Science and Technology Activities in Local Areas, which was approved by the Prime Minister in December 1995. With increasing importance placed on promoting regional research, the prefectural governments are actively making efforts to promote science and technology by establishing councils, etc., to deliberate policies for the promotion of science and technology, and adopting outlines and guidelines for science and technology policies individually (Tables 3-3-11 and 3-3-12).

Table 3-3-11 State of establishment of science and technology councils at the local government level

Prefecture/ designated city	Name of science and technology council	Established
Hokkaido	Hokkaido Science and Technology Council	September 1952
Aomori	Aomori Industry, Science and Technology Council→ Aomori Research and Development Conference	December 1997→June 1999
Akita	Akita Council for Science and Technology	August 2002
Iwate	Iwate Science and Technology Promotion Council	April 1989
Miyagi	Miyagi Conference on Guidelines for Promoting Science and Technology	July 1998 through March 1999
Yamagata	Yamagata Science and Technology Council	April 1999
Fukushima	Fukushima Science and Technology Promotion Council	May 1997
Ibaraki	Ibaraki Science and Technology Promotion Council	September 2003
Tochigi	Tochigi Science and Technology Promotion Council	July 1999
Saitama	Saitama Science and Technology Council	January 1995
Chiba	Chiba Science Council	November 1994
Kanagawa	Kanagawa Science and Technology Council	June 1988
Niigata	Niigata Science and Technology Council	April 1998
Toyama	Toyama Science and Technology Council	November 1983
Ishikawa	Ishikawa Industrial Innovation Strategy Council (Transferred Ishikawa Industrial Science and Technology Council)	Transferred November 2003
Fukui	Fukui Science and Technology Promotion Council → Council for Fukui Production Planning Strategy	April 1998 through March 2004, May 2004
Yamanashi	Yamanashi Science and Technology Council	September 1991
Gifu	Gifu Science and Technology Promotion Council	July 1996
Aichi	Aichi Science and Technology Council	February 2000
Mie	Mie Science Academy Representative Conference	April 2001
Shiga	Shiga Science and Technology Promotion Council	April 2003
Kyoto	Kyoto Science and Technology Council	September 1961
Osaka	Osaka Science and Technology Roundtable	December 1986
Hyogo	Hyogo Science and Technology Council	April 2000
Wakayama	Wakayama Prefecture Science and Technology Strategy Council	September 2004
Tottori	Tottori Science and Technology Promotion Council	March 1999
Shimane	Shimane Science and Technology Promotion Council	October 1998
Hiroshima	Hiroshima Science and Technology Promotion Conference	May 1992 through March 1994
Yamaguchi	Yamaguchi Science and Technology Council	May 1991
Kagawa	Kagawa Science and Technology Council	August 1997

Prefecture/ designated city	Name of science and technology council	Established
Ehime	Ehime Science and Technology Promotion Council	July 2001
Tokushima	Tokushima Forum for the Promotion of a vision for a Science and Technology	June 1998 through March 1999
Kochi	Kochi Science and Technology Promotion Council	June 1997
Saga	Saga Science and Technology Council	February 1996
Nagasaki	Nagasaki Science and Technology Promotion Council	October 1998
Kumamoto	Kumamoto Science and Technology Council	September 1999
Miyazaki	Miyazaki Science and Technology Council	August 2001
Kagoshima	Kagoshima Science and Technology Promotion Council	April 2003
Okinawa	Council for Promotion of Science in Okinawa	January 1995
Kawasaki City	Kawasaki City Innovation Promotion Meeting	August 2003
Yokohama City	Yokohama City Council for Promotion of Cooperation Between Industry and Academia	October 1999 through March 2003
Kyoto city	Kyoto City Conference on Projects for Promoting Industry, Science and Technology	August 2005
Osaka City	Osaka City Council for Promotion and Planning of Industry, Science, and Technology	May 2000
Hiroshima City	Hiroshima City Science and Technology Advisory Council	October 2003
Kitakyushu City	Kitakyushu City Science and Technology Promotion Council	November 2002 through March 2004
Fukuoka city	Fukuoka City Adviser Meeting on Vision for Promotion of Science and Technology	September 2001 through June 2002

Table 3-3-12 Enactments of science and technology promotion policies by local governments

Prefecture/ designated city	Science and technology promotion policy	Date of enactment
Hokkaido	Guidelines for Promoting Science and Technology in Hokkaido	March 2000
Aomori	Guidelines for Promoting Industry, Science and Technology in Aomori Prefecture	December 1998
Akita	Basic Concept for Science and Technology in Akita Prefecture	June 2000
Iwate	Guidelines for Promoting Science and Technology in Iwate Prefecture (New Guidelines for Promoting Science and Technology in Iwate Prefecture)	May 1990 (Revised November 2000)
Miyagi	Guidelines for Promoting Science and Technology in Miyagi Prefecture	March 1999
Yamagata	General Outline of Science and Technology Strategies in Yamagata Prefecture→ General Outline of Science and Technology Strategies in Yamagata Prefecture	November 1998→March 2006
Fukushima	General Outline of Science and Technology Strategies in Fukushima Prefecture	March 2002
Ibaraki	General Outline of Science and Technology Strategies in Ibaraki Prefecture→ Guidelines for Promoting Science and Technology in Ibaraki Prefecture	March 1994→March 2005
Tochigi	Guidelines for Promoting Science and Technology in Tochigi Prefecture	December 1998
Gunma	Guidelines for Promoting Science and Technology in Gunma Prefecture	March 1999
Saitama	Saitama Technology Policy for the 21st Century	February 1998 (Revised March 2007 (Not fixed))
Chiba	General Guidelines for Chiba Science Plan	February 1996
Tokyo	Tokyo Metropolitan Government Guidelines for the Promotion of Industrial Science and Technology	February 2004
Kanagawa	General Guideline for Kanagawa Science and Technology Sixth Plan	May 1990 (Revised March 2002)
Niigata	General Outline of Science and Technology in Niigata Prefecture	March 1998
Toyama	General Guidelines for Toyama Science and Technology (New Toyama Prefecture Science and Technology Plan)	October 1991 (Revised March 2001)
Ishikawa	Guidelines for Promoting Industry, Science and Technology in Ishikawa Prefecture	February 1999
Fukui	Guidelines for Promoting Science and Technology in Fukui Prefecture	January 1998

Yamanashi	Yamanashi Science and Technology Sixth Plan (Yamanashi Plan for Promoting Science and Technology)	March 1992 (Revised March 1999)
Nagano	Guidelines for Promoting Science and Technology and Industry in Nagano Prefecture	April 2000
Gifu	Basic Strategies for Science and Technology in Gifu Prefecture	March 1997 (Revised March 2002)
Shizuoka	Vision for Promoting Science and Technology in Shizuoka Prefecture	February 2000
Aichi	General Guidelines for Promoting Science and Technology in Aichi Prefecture	March 1999
Mie	Vision for Promoting Science and Technology in Mie Prefecture	July 1999
Shiga	Shiga Science and Technology Plan	March 1995 (Revised October 2004)
Kyoto	Promotion Plan for Industry and Technology in Kyoto	February 1995
Osaka	Osaka Research and Development Charter Guidelines for Industry, Science and Technology in Osaka → Guidelines for Promoting Industry, Science, and Technology in Osaka→Strategies Promoting Science and Technology in Osaka Metropolitan Area (draft)	March 1988 → Revised March 1998 → March 2006
Hyogo	General Guidelines for Hyogo Science and Technology Sixth Plan (New General Guideline for Hyogo Science Technology Plan)	March 1991 (Revised March 1998)
Nara	Guidelines for Promoting Science and Technology in Nara Prefecture	March 2003
Wakayama	Vision for Promoting Science and Technology in Wakayama Prefecture	March 2000
Tottori	Investigative Report on the Promotion of Science and Technology in Tottori Prefecture	March 1998
Shimane	Guidelines for Promoting Science and Technology in Shimane Prefecture	March 1999
Okayama	Guidelines for Promoting Science and Technology in Okayama Prefecture	March 1998
Hiroshima	Fundamental Principles of the Promotion of Science and Technology in Hiroshima Prefecture	November 1993
Yamaguchi	Guidelines for the Promotion of Science and Technology in Yamaguchi Prefecture	March 1994
Tokushima	Vision for Promoting Science and Technology in Tokushima Prefecture	March 1999
Kagawa	Vision for Promoting Science and Technology in Kagawa Prefecture	March 1997 (Revised March 2001)
Ehime	Guidelines for Promoting Science and Technology in Ehime Prefecture	March 2003
Kochi	Guidelines for Promoting Science and Technology in Kochi Prefecture	March 1998
Fukuoka	Guidelines for the Creation of a Scientific and Technological Fukuoka Prefecture	March 1999
Saga	Vision for Promoting Science and Technology in Saga Prefecture	March 1997
Nagasaki	Vision for Promoting Science and Technology in Nagasaki Prefecture	June 1998
Kumamoto	Guidelines for Promoting Science and Technology in Kumamoto Prefecture	May 1999 (Revised March 2004)
Oita	Guidelines for Promoting Science and Technology in Oita Prefecture	March 2003
Miyazaki	Guidelines for Promoting Industry, Science, and Technology in Miyazaki Prefecture	March 2001
Kagoshima	Guidelines for Promoting Science and Technology in Kagoshima Prefecture	March 2003
Okinawa	General Guidelines for Science and Technology Promotion in Okinawa Prefecture→ Guidelines for Promoting Science and Technology in Okinawa Prefecture	February 2000→August 2005
Sapporo City	Vision for Promoting Science and Technology in Sapporo City	June 2004
Kawasaki City	Guidelines for Promotion of Science and Technology in Kawasaki City	March 2005
Yokohama City	Guidelines for Promoting Science and Technology in Yokohama-city	August 1999
Kyoto City	Concept for Super Technology in Kyoto City→Plan for Promoting Industrial Science and Technology in Kyoto City	March 2002→Enacted in June 2006 (Not fixed)
Osaka City	Plan for Promoting Industrial Science and Technology in Osaka City	March 2000
Hiroshima City	Hiroshima City Science and Techonology Policy	June 2003
Kitakyushu City	Blief Guidelines for Promotion of Science and Technology in Kitakyusyu City	August 2003
Fukuoka City	Vision for Promoting Science and Technology in Fukuoka City	June 2002

The Second Science and Technology Basic Plan calls for the government to promote research and development activities, including joint research, to develop and retain human resources, and to expand technology transfer functions, etc., for the effective and efficient creation of Knowledge Clusters under local initiatives. In response, the Ministry of Education, Culture, Sports, Science, and Technology launched the "Knowledge Cluster Initiative" in FY2002.

The following sections provide overviews of various policies that are being taken by the national government to support the promotion of science and technology at the regional level.

3.3.3.1 Aiming Toward the Creation of Knowledge Clusters and Industrial Clusters

(1) Knowledge Cluster Initiative

A "Knowledge Cluster" is a local technological innovation system organized around universities and other public research institutions that have unique R&D themes and potential. Businesses located inside and outside various regions are also expected to enter into these systems. More specifically, these systems successively drive technological innovation and create new industries through mutual stimulation between technological seeds in research institutions and practical needs in the real business world. Human networks and joint research entities are also expected to be established in this process.

The Ministry of Education, Culture, Sports, Science and Technology launched the Knowledge Cluster Initiative in FY2002. In FY2004, the project was being run in 18 regions nationwide. In specific terms, each region sets up a "Knowledge Cluster Headquarters" staff with specialist science and technology coordinators, utilizes advisors such as patent attorneys, and carries out industry-academia-government joint research at university research centers or other institutions, which are expected to produce new technological seeds in accordance with industrial needs (Figure 3-3-16). In FY2005, MEXT is working to strengthen its coordination with the Industrial Cluster Project conducted by the Ministry of Economy, Trade and Industry, and supporting personnel development in the field of regional science and technology. The Ministry is conducting interim evaluation on the starting regions for the first fiscal year as well as review of project planning and budget allocation in accordance with the interim evaluation. In addition, the Cooperation for Innovative Technology and Advanced Research in Evolutional Area (CITY AREA) program was implemented in FY2002 and was implemented in 50 areas by the end of FY2005. This program aims to grow the seeds of new technologies by using the "wisdom" of universities, creating new enterprises, and fostering regional R&D-based industries while attaching importance to the unique characteristics of local areas and cities. Among areas where projects are completed, 5 regions that made especially outstanding results have been running the "development-type" as a model project since FY2005.

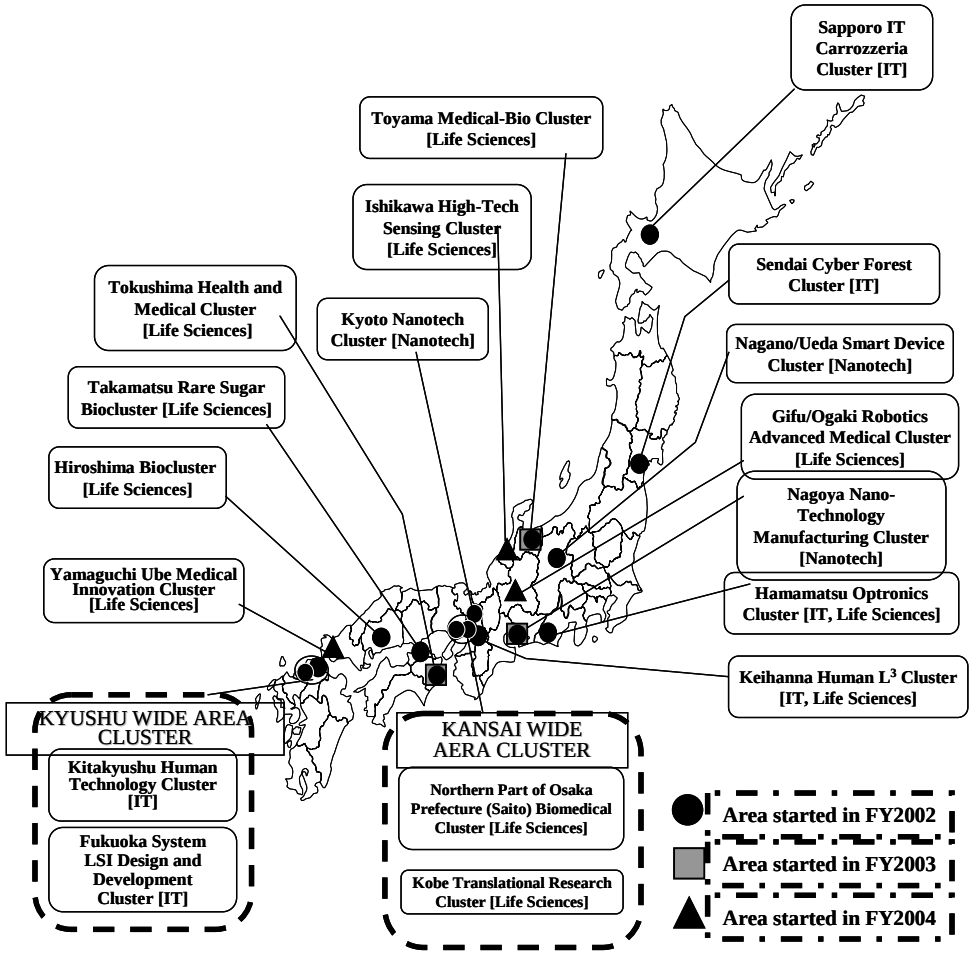


Figure 3-3-13 Map of the Knowledge Clusters

(2) The Industrial Cluster Project (Project for Regional Regeneration and Industrial Clustering)

An "Industrial Cluster" is a system that takes the technological innovation of universities and other public research institutions, and of business enterprises in the surrounding area, and encourages wider area cooperation between the universities, etc., and the business enterprises, and between different enterprises, to create a chain reaction of innovation and creation of new businesses and industries.

The Ministry of Economy, Trade, and Industry's "The Industrial Cluster Project" involves the regional bureaus of the Ministry of Economy, Trade, and Industry as the hubs of the formation of wide-area human networks of industry, academia, and government, including local enterprises, universities, etc., aiming for participation in world markets, and that uses comprehensive and effective implementation of the Ministry's regional measures to support local economies and form industrial clusters that can foster new business enterprises capable of competing in worldwide markets. Specifically, the Ministry currently has 19 such projects around Japan, operating with the cooperation of local public authorities, each forming wide-area personal networks of industry, academia, and government that include 6,100 small and medium-size companies with ambitions to enter world markets, and about 250 universities. These projects are implemented to promote improvements in the quality and volume of information flowing among industry, academia, and government, to supplement business

management resources with information about technology, business management, and marketing channels, to support technology development that brings out local characteristics, and to develop entrepreneurial fostering facilities (business incubators) and business environments.

Support for technology development in local areas that leads to practical applications and the development of business incubators will be effective in promoting structural reform of industry and revitalizing the economy, by boosting industrial vitality and creating new business enterprises that will lead to the medium and long-term creation of industry and employment. Outlays of 48 billion yen from the FY2005 initial budget have strengthened measures related to the "The Industrial Cluster Project," centering on support for technology development in local areas that leads to practical applications. So far, a promotion organization was developed for each project, networks formed among industry, academia, and government, and efforts moved forward to develop technologies that lead to practical applications (Table 3-3-14).

Additionally, subsidies are provided to a promotion organization and other organizations (core organizations) which are supporting the creation of new enterprises through the formation of human networks in certain regions and sectors, and the deployment of cluster managers who comprehensively coordinate each cluster's activities.

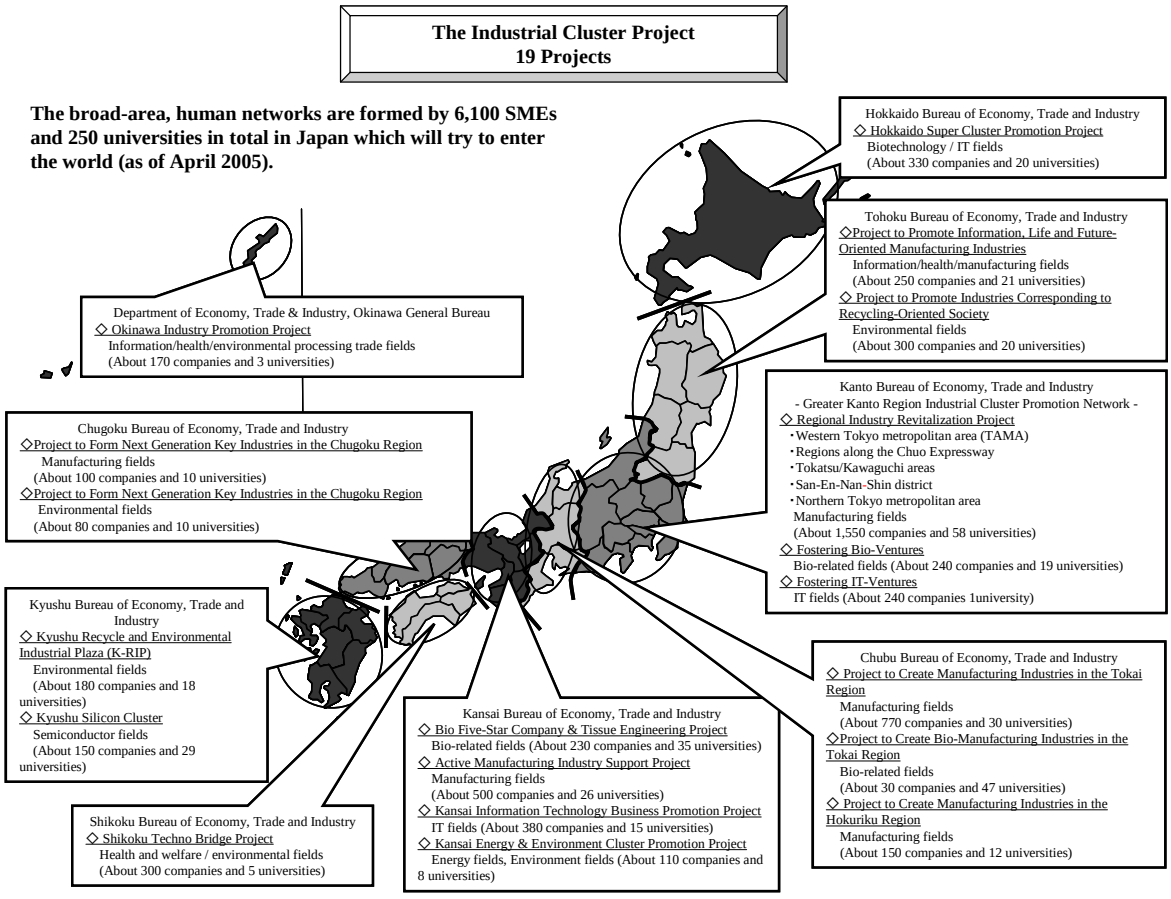


Figure 3-3-14 The Industrial Cluster Project

(3) Coordination between the Knowledge Cluster Initiative and the Industrial Cluster Project

The Ministry of Education, Culture, Sports, Science and Technology is working to create new technology seeds by promoting joint research among industry, academia, and government in fields of creative basic research, focusing on universities and public research institutions in regional areas. The Ministry of Economy, Trade and Industry is working to open up new fields for businesses, and to create start-ups and new products by promoting collaboration projects among industry, academia, and government, such as technology development that leads to practical applications, focusing on business enterprises. Both ministries work together to promote the development of systems of collaboration among industry, academia, and government in regional areas, and both aim to revitalize regional economies and stimulate Japan's national economy by working in close coordination to supply feedback on market needs and provide new technology seeds through their programs, which are adjusted to be in close coordination. Specifically, the Ministry of Education, Culture, Sports, Science and Technology, the Ministry of Economy, Trade and Industry, local public authorities, and other relevant entities are holding the "Committee for Regional Cluster Promotions" for each region, and joint conferences to announce both ministries' project results. Furthermore, in continuity with FY2004, the ministries held a nationwide symposium to announce summarized versions of the achievements of such projects, as well as a "Regional Clusters Seminar" and "Nationwide Knowledge and Industrial Clusters Forum" to discuss methods for promoting cluster policies in regions across Japan with Nihon Keizai Shimbun, Inc. being invited as a new co-organizer in FY2005. In addition, close collaboration among ministries and agencies concerned is being promoted through the "Coordination Program for Science and Technology Projects" of the Council for Science and Technology Policy and the "Inter-Ministry Liaison Conference on Regional Science and Technology" and the "Regional Block Conference on Regional Science and Technology." Moreover, the "Conference on Promotion of Regional Science and Technology" hosted by the MEXT and Tokushima Prefecture in FY2005, the hosts, co-hosted ministries, and co-hosted agencies exchanged opinions between the government and regions in order to make them reflected in the Third Science and Technology Basic Plan. Thus, collaboration is being enhanced.

3.3.3.2 Various Policies on the Promotion of Regional Science and Technology

The relevant national government ministries are implementing a variety of measures aimed at promoting regional science and technology (Table 3-3-15). The following sections introduce some of the main examples concerning research activities conducted by each government ministry.

Table 3-3-15 Major regional science and technology promotion measures

Ministry or Agency, related organizations	Item	Outline of measures
Ministry of Internal Affairs and Communications	Regional proposal-based research and development programs	Canvasses for research and development topics in response to regional needs in the research community of the industry, academia and government, and sponsored research are carried out.
Ministry of Education, Culture, Sports, Science and Technology Science and Technology Policy Bureau	Knowledge Cluster Initiative	13 clusters (15 regions) were selected nationwide to create internationally competitive knowledge-centered systems for technological innovation (Knowledge Clusters). Knowledge Clusters will be organized closely around the knowledge creation bases, which consist of universities or public research institutions. Other related public institutions and R&D firms are also expected to come into this program. Proper attention to the autonomy of local governments should be paid in the whole process.
	Cooperation for Innovative Technology and Advanced Research in Evolutional Area (CITY AREA)	Through local independence, new technology seeds can be created by utilizing the "wisdom" contained in universities, achieving new industry creation and the development of R&D-type local industries. In addition, it is hoped to establish an independent and on-going industry-academia-government collaboration.
	Projects for development of locally led science and technology basic research	Supports projects run by local authorities for the development of the basic facilities that contribute to pioneering research using regional characteristics and potential. (Concluded at FY2005)
	Promotion of Pilot Research (Special Coordination Funds for Promoting Science and Technology)	Implements pioneering R&D that brings out the character of local areas and that targets areas that require boundary or interdisciplinary research and development across a multiple number of science and technology sectors.
	Collaboration of Regional Entities for the Advancement of Technological Excellence (Japan Science and Technology Agency)	Aims to establish and reinforce a science and technology foundation that creates new technologies and industries in priority research fields set by the national government. Also explores new research areas through joint research by rallying regional potential in universities, national and other public research institutes, and R&D oriented private companies.
	Regional Science Promotion (RSP) Program (Japan Science and Technology Agency)	To help support local governments when they improve bases for regional coordination, Japan Science and Technology Agency commissions science and technology coordinators and promotes the creation of new technologies and industries by fostering university research results.(Concluded at FY2005)
	Science and Technology Incubation Program in Advanced Regions (Japan Science and Technology Agency)	Aims to create new business projects through technological innovation. At Innovation Plazas located in 8 regions and JST Satellite in 4 regions the Japan Science and Technology Agency promotes the fostering of research results achieved through exchange among industry, academia, and government that utilize creative regional research results, and establish cooperation between local communities and researchers at universities, national research institutions, etc.
Ministry of Agriculture, Forestry and Fisheries, Agriculture, Forestry and Fisheries Research Council Secretariat	Research project for utilizing advanced technologies in agriculture, forestry and fisheries	This project offers R&D funds to suitable projects in the fields of production, growing local seeds of technology or fulfilling regional needs (Competitive research fund).
Ministry of Economy, Trade and Industry	Regional consortium research and development Subsidies for research and development for creating new industries in the region	Research and development by a joint research system by an Industry, Academia and Government consortium is implemented by utilizing technology seeds and wisdom contained in universities. Supports high-risk research and development for expanding new lines of business by SMEs or starting businesses by ventures.
Ministry of the Environment, Environmental Policy Bureau	Research Funds for the National Organization for Pollution Prevention (Environment research to meet regional needs)	Implements joint research among national experimental research institutions, incorporated administrative research institutes and other public research institutions on research subjects where local needs are great and investigation into local environmental characteristics are required.
	Promotion funds for research and development and others (framework of research and development issues to utilize regional identity/characteristics)	Implements research and development issues to utilize regional identity/characteristics for developing specific advanced environmental technology promotion and regional environmental business through promotion concentrating on regional research and development.

(1) Research programs, etc.

To implement basic and pioneering research and development that fulfills regional needs and potential, it is important to promote coordination and exchanges among industries, academia, and governments. For this reason, it is necessary to develop a diverse range of research programs and to strengthen the coordination functions for research and development. In this regard, government ministries have implemented the following research programs.

1) Ministry of Internal Affairs and Communications

The regional information and communications technology promotion-style R&D in the Information and Communications R&D Promotion Program is promoting joint research in the information and communications field between small and medium-sized enterprises and universities engaged in research and development contributing to the creation of local-based new industries, the promotion of local industries or the reinvigoration of local communities

In order to support the independence and social involvement of the elderly, the National Institute of Information and Communications Technology (NICT) seeks the cooperation of local government authorities and implements research and development that is aimed at establishing telecommunications systems with advanced features that are sought within the welfare sector.

2) Ministry of Education, Culture, Sports, Science and Technology

Functioning as joint research among industry, academic and government focusing on individual research and development topics with a high necessity of practical application at the regional level, the Collaboration of Regional Entities for the Advancement of Technological Excellence is being implemented. The program aims to conduct R&D leading toward commercial application, which will contribute to the creation of new technologies and industries, such as the development of prototypes based on technological seeds created from basic research by universities, etc.

2) Ministry of Agriculture, Forestry and Fisheries

In order to promote technology development directly related to agricultural production, the Ministry of Agriculture, Forestry and Fisheries implements research to promote key agricultural technology systems at the regional level, through large-scale and integrated research that includes on-site verifications in paddy fields.

In FY2002, the Ministry began implementing a project that invites proposals from the public. Relying on local initiative, the "Project for Research Advancement in Agriculture, Forestry, and Fisheries Utilizing Advanced Technologies" aims at rapid promotion of experimentation and research in the agriculture, forestry, and fisheries sector that has real relevance to working sites.

4) Ministry of Economy, Trade and Industry

In order to create new regional industries and businesses, and to revitalize regional economies, advanced R&D for practical application is being implemented under a strong joint industry-academia-government research system (regional rebirth consortium) utilizing seed technologies and knowledge of universities, etc. In addition, the Ministry is implementing projects to support medium- and small-sized corporations' advancing into new sectors, and high-risk R&D by entrepreneurial ventures aiming to create new businesses.

5) Ministry of Land, Infrastructure and Transport

In order to facilitate coordination between industry, academia and government in various research and development programs that will contribute to the enhancement of international competitiveness, the realization of a safe and secure society, and solution of environmental problems, and to further promote the utilization of research results, the Second Advanced Technology Forum for Land, Infrastructure, and Transportation was held in Nagoya in February 2006, with 441 representatives of local industry, academia, and governments, as well as representatives of the Ministry and relevant research institutions attending. At the forum, the Ministry's pioneering research results and intellectual property, etc. were introduced, and the participants had face-to-face dialogues.

6) Ministry of the Environment

The Ministry implements the Regionally Linked Environmental Research Program, which carries out joint research with national research institutions, incorporated administrative research institutions, and public research institutions. This program focuses on research themes for which there is strong demand at the regional level, and which require study that matches the characteristics of the regional environment. In order to help develop and disseminate environmental technologies in specific terms, and promote global environment business by focusing on the promotion of regional R&D, the ministry is implementing R&D projects utilizing regional uniqueness and their characteristics.

(2) Promotion of Technology Transfers at Innovation Plazas (Science and Technology Incubation Program in Advanced Regions)

The Japan Science and Technology Agency (JST) aims to create new business projects through technological innovation. At Innovation Plazas located in 8 regions and JST Satellites in 4 regions, JST promotes the fostering of research results achieved through exchange among industry, academia, and government that utilizes creative regional research results, and establishes cooperation between local communities and researchers at universities and national and public research institutions.

(3) Strengthening the Activities and Functions of Public Experimental Research Institutions as R&D and Technology Support Organizations

In order to provide R&D and technology support, etc., that leads to the advancement of industries and academia at the regional level, the relevant government ministries are implementing various measures directed at public experimental research institutions. These measures are summarized in Table 3-3-16

Table 3-3-16 Strengthening of the activities and capacities of research and development and technology support functions at public research institutions

Ministry or agency	Summary of support function
Ministry of Internal Affairs and Communications	Adopts local tax grant measures for the research and development activity expenses of prefectural industrial technology centers, sanitation research institutes, agricultural test sites, livestock test sites, forestry test sites, and other public testing and research institutions.
Ministry of Agriculture, Forestry and Fisheries	Provides support for prefectural testing and research through the following projects: Projects consigned to prefectural test and research institutions, and implemented as part of national testing and research ・Quality improvement tests ・Compliant Tests on priority issues
Ministry of the Environment	・Promotes joint research with the environment laboratory, etc., of local governments (prefectural or city governments), to contribute toward the preservation and improvement of the local environment ・The National Environmental Training Institute offers training for local governmental officers, etc., for the objective of training in analytical relationship technologies, etc.

(4) Interregional Coordination and Exchanges

The following measures are being implemented in order to encourage coordination and exchanges between the national government and local government authorities, as well as between different regions.

●Research exchange and other programs of the Japan Association for the Advancement of Research Exchange Cooperation

The Japan Association for the Advancement of Research Exchange Cooperation (JAREC) was established in June 1992, based on funds provided by local government authorities, with the aim of supporting research exchanges and promoting regional research about S&T. This association implements various research support programs and nationwide research exchange programs for regions commencing cutting edge or basic research.

●Industrial Technology Liaison Council

The Industrial Technology Liaison Council was established in 1954 in order to strengthen cooperation among public research institutions and/or with national research institutions in relation to mining and manufacturing technology, to effectively promote experiments and research between institutions, and thus to improve industrial technologies. The council is composed of seven liaison divisions, eight regional councils, and a welfare technology division that is a horizontal organization. The council serves to facilitate research cooperation, research coordination, research exchanges, and information exchanges among public research institutions as well as between public and national experimental research institutions.

3.3.3.3 Supporting the Concentration of R&D Functions

Policies aimed at the promotion of industry in order to invigorate regional areas have hitherto tended to concentrate on enticing corporations to locate to that area, and on the incidental development of roads, harbors, and other hard infrastructure in the surrounding environment. In recent years, however, this approach has been supplemented by measures supporting the development of research equipment, research facilities and other items in the target regions, and the provision of subsidies and other measures for research and development. The following laws and measures represent an integrated approach to supporting the concentration of research and development functions.