3.3 Reforming the Science and Technology System

3.3.1 Developing, Securing and Activating Human Resources

3.3.1.1 Establishment of Environment that Enables Individuals to Play Active Roles

The future of science and technology in Japan and the maintenance and enhancement of the country's international competitiveness depend on the capabilities of people fostered in Japan, and it is important to cultivate an environment that enables a diverse pool of individuals, including young researchers, female researchers, foreign researchers and distinguished elderly researchers, to become highly motivated and exercise their capabilities. Described below are the outlines of major policies adopted by government ministries and agencies as categorized by purposes.

With regard to the Ministry of Agriculture, Forestry and Fisheries, it should be noted that the ministry in March 2006 formulated a "human resource development program for agriculture, forestry and fisheries research" in order to foster researchers and other necessary personnel in the agriculture, forestry and fisheries sectors in a comprehensive manner.

(1) Supporting the Independence for 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. To do so, research organizations must promote the activities of young researchers by providing them with opportunities to achieve independence and play active roles based on a fair and unambiguous personnel evaluation. Meanwhile, it is desirable that universities actively offer assistant professors positions to, and provide research opportunities for young researchers in order to further promote their activities.

In order to foster next-generation researchers in the field of information and communications technologies, the Ministry of Internal Affairs and Communications is implementing the "Research and Development through Encouraging Young ICT Researchers" as part of the Strategic Information and Communications R&D Promotion Programme, thus providing research funds for R&D themes proposed by young researchers.

Meanwhile, MEXT in fiscal 2006 started a new program called Young Researchers' Independent Research Environment Support Program with the use of Special Coordination Funds for Promoting Science and Technology (SCF) so as to enable young researchers to play an active role. Under this program, MEXT currently provides support to nine universities, assisting the introduction of the tenure track system (which enables young researchers to gain experiences as independent researchers by obtaining a fixed-term position at universities, etc. and then get a more stable position after undergoing rigorous screening of their achievements (1.1.4.3(1)) and helping efforts to improve the research environment by providing start-up funds necessary for independent research activities and securing research spaces.

Moreover, MEXT has been enhancing efforts to foster young researchers who have flexible mind-sets and a spirit of challenge through the provision of Grants-in-Aid for Scientific Research. In fiscal 2006, it established a new grant program called " Grant-in-Aid for Young Scientists (Start-up)", which is intended for people who have only recently obtained research jobs at universities, and earmarked around 27.8 billion yen for research grants as part of its effort to expand competitive funds for young researchers.

In addition, MEXT provides excellent young researchers with opportunities to devote themselves to research activities while independently choosing the topics without any restriction through the JSPS Research Fellowship for Young Researchers program of the Japan Society for the Promotion of Science. MEXT also provides young researchers with opportunities to gain research experiences abroad and improve themselves by competing with foreign researchers through the Postdoctoral Fellowship for Research Abroad program so as to foster and secure researchers capable of playing an active role across national borders.

The Ministry of Health, Labour and Welfare has a quota for young researchers under each project funded by the Health and Labour Sciences Research Grants program.

The Ministry of Agriculture, Forestry and Fisheries has an award to commend researchers who have made excellent achievements in the agriculture, forestry and fisheries sector and who are less than 40 years old so as to enhance young researchers' research motivation.

Meanwhile, the National Agriculture and Food Research Organization is implementing a research promotion program aimed at supporting innovative

research by young researchers.

The Ministry of Economy, Trade and Industry is providing, through the New Energy and Industrial Technology Development Organization, subsidies for young researchers' R&D activities aiming at industrial applications. 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.

(2) Improvement in mobility of human resources

In order to train researchers with broad perspectives creativity, and to achieve competitive and dynamic R&D environments, it is important that the mobility of researchers is improved and that researchers gain experiences at various research sites.

The Third Science and Technology Basic Plan calls for universities and public research organizations to make continued efforts to ensure widespread adoption of a fixed-term system, which is proceeding at the organizations concerned. (Tables 3-3-1 and 3-3-2). With regard to the employment of professors, it is possible that the proportion of alumni members in teaching staff turns out to be high as a result of selecting excellent personnel through a fair and unambiguous hiring process. However, generally speaking, it would not be desirable that alumni members occupy higher proportions excessively. Universities should pay sufficient attention to the proportion of alumni members in their teaching staff, and it is expected that universities with an excessively high proportion of alumni members endeavor to lower the proportion.

(3) Promotion of activities of female researchers

The ratio of female researchers in Japan is lower than in the USA and European countries. It is important to promote activities of female researchers not only in order to promote gender equality but also in order to broaden the base of science and technology-related human resources.

Therefore, the Third Science and Technology Basic Plan aims to increase the ratio of female researchers employed for positions related to natural science research to 25% and calls for a variety of initiatives to promote activities of female researchers.

In response, MEXT in fiscal 2006 established, as part of the JSPS Research Fellowship for Young Researcher of the Japan Society for the Promotion of Science, a research

Table 3-3-1 Status of introduction of fixed-term system at research organizations, etc.

	Number of organizations	Number of full-time researchers on fixed-term contract	Ratio of fixed-term researchers
National experiment and research organizations	28	131	6%
Designated incorporated administrative agency-type research organizations and authorized corporation-type research organizations	6	33	21%
Non-designated incorporated administrative agency-type research organizations	37	2,588	23%

Source: MEXT survey (March 2006)

Table 3-3-2 Status of introduction of fixed-term system for university teachers

	Number of universities, etc.	Number of people employed for fixed-term	Ratio of fixed-term teachers
National universities	76	8,453	14%
Public universities	32	1,324	12%
Private universities	369	9,890	11%
Inter-university research organizations	14	199	15%

Source: MEXT survey (October 2005)

grant quota intended specifically for cultivating an environment that enables excellent researchers forced to suspend research activities for child bearing and rearing to return to work.

Moreover, since fiscal 2006, MEXT has been implementing a program to publicly invite proposals for initiatives that will serve as a model project to enable female researchers to simultaneously perform the duties of researchers and mothers, with the use of Special Coordination Funds for Promoting Science and Technology, with such initiatives underway at 10 universities now.

Besides, MEXT is implementing a project to encourage junior high and high school girls to enroll in science-related programs at universities and colleges by creating opportunities for them to mingle with female researchers and by providing experiment courses and catering lessons as a way to foster schoolgirls' interest in science and technology. METI has also implemented the "project to support women's choice of science and engineering courses," which examines practical initiatives to encourage school girls to choose science and engineering courses and diffuse the findings through training of educators, etc.

The Cabinet Office is carrying out a program called "Let's Try --Choice of Science and Engineering Courses for Upper secondary school Girls, etc.--" in order to provide female students at upper secondary schools and other educational institutions with information related to science and engineering fields and to raise their awareness about such fields.

The National Institute of Advanced Industrial Science and Technology (AIST) established the Gender Equality Office in April 2006, and it has since held symposiums on promotion of gender equality and employment seminars for female students. It also introduced special child-care holidays and expanded a research and office work assistant program so as to enable simultaneous fulfillment of work and child-bearing duties.

The Ministry of the Environment relaxes the age limits on its competitive funding programs for research grant applications from female researchers in light of their need to spend time on child bearing and rearing.

(4) Promotion of activities of foreign researchers

In the midst of promotion of the active participation of a diverse range of personnel, it is important to prepare an environment that allows talented researchers from other countries to live and work in Japan, from the perspective of not only securing personnel, but also improving the level and internationalization of research activity in Japan.

However, the percentage of foreigners in general among highly-skilled workers is extremely low in Japan relative to international levels (Figure 3-3-3). Among researchers, there are only about 11,000 foreigners[21], accounting for only 1.4% of the total number of researchers in Japan.

The acquisition of talented researchers is currently the focus of fierce international competition among the USA, China and countries in Europe. In order to attract excellent foreign researchers, Japan has reformed the immigration control system so as to expand the special measure of allowing foreign researchers to stay in Japan for up to five, up from the usual three years, which was previously applied only to Special Zones for Structural Reform where the "program for the promotion of acceptance of foreign researchers" was underway, to the whole of the country. Japan is also endeavoring to attract excellent foreign researchers to Japan through measures such as supporting the globalization of the research environment in Japan through the Strategic Fund for Establishing International Headquarters in Universities. In addition, the Japan Society for the Promotion of Science invites about 1,700 excellent foreign researchers per year to Japan through the Postdoctoral Fellowship for Foreign Researchers.

[21] The total number of foreigners who are qualified to stay in Japan as "professors" and "researchers" as shown in "Statistics on the Foreigners registered in Japan" by the Justice Ministry.

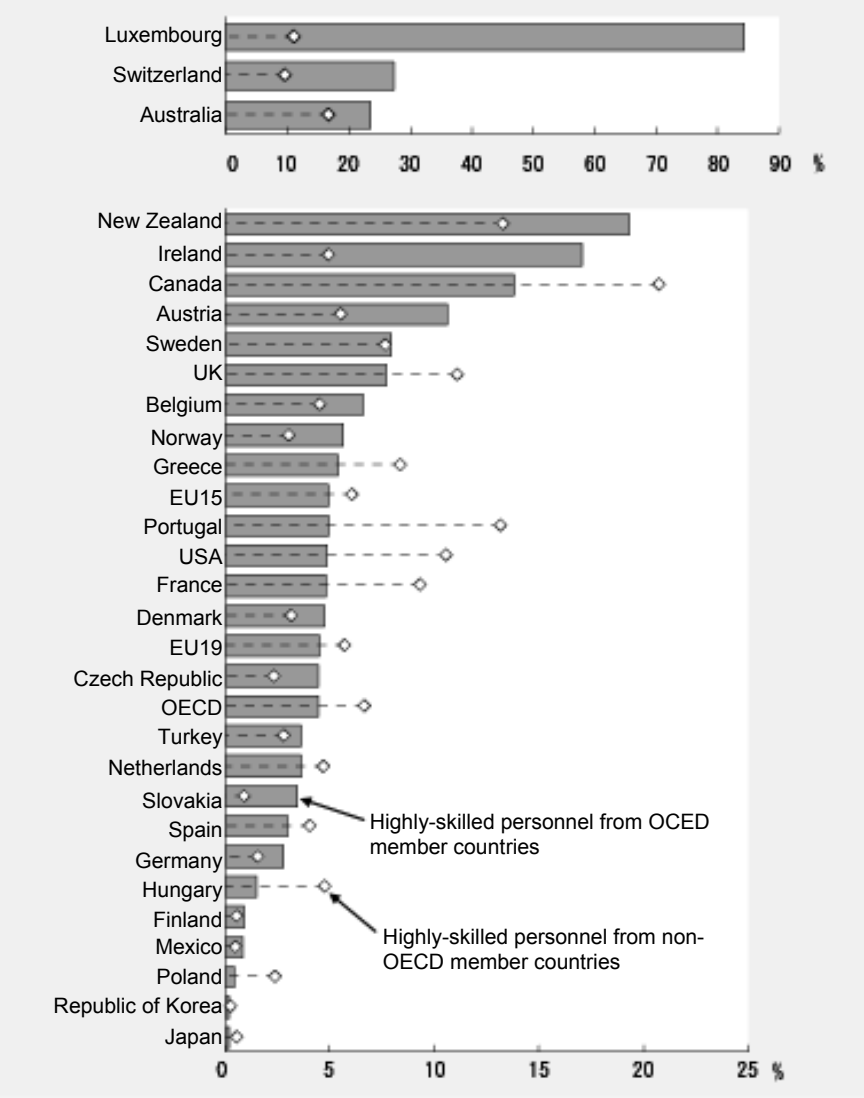


Figure 3-3-3 Proportion of foreigners in highly-skilled personnel (international comparison)

(5) Utilization of able elderly researchers

In accordance with the amended Act for the Stabilization of Employment of Elderly People, the National Institute of Advanced Industrial Science and Technology (AIST) in fiscal 2006 decided to introduce a re-employment system that allows employment of people aged up to 65, effective from fiscal 2007.

3.3.1.2 Strengthening Universities' Human Resource Development Function

(1) Human resource development at universities

Universities, which are essential institutions for the creation and utilization of knowledge, have a large role to play in fostering human resources endowed with the creativity, broad perspective and flexible thinking necessary for exercising leadership across national borders. Universities are actively working to improve education, indeed. For example, the number of universities introducing a major-minor system that enables students to study a broad range of fields

systematically has been increasing over the past years, with a total of 128 universities adopting this system as of fiscal 2005. Meanwhile, MEXT provides support to efforts by national, public and private universities to reform university education in order to promote implementation of education and research that reflect their own characteristics. With regard to the enhancement of the teaching staff's capabilities in terms of educational and research guidance, 575 universities were engaged in the faculty development[22] as of fiscal 2005, and 255 universities had a system to evaluate teachers' performance in terms of education as of fiscal 2005.

(2) Drastic enhancement of graduate school education

In a modern society in which the specialization and segmentation of knowledge is progressing and international competition is intensifying, there is a pressing need to develop human resources equipped with both deep expertise and broad versatility that can adapt to new academic fields and rapid technology innovations. With regard to graduate schools, which should play the central role in the development of such human resources, improvement has steadily been made in quantitative terms, with the number of graduate school students rising by about 90,000 over the 10-year period between fiscal 1997 and 2006. From now on, it is necessary to further improve the quality of education at graduate schools.

In this context, it is important to have graduate schools clarify the objectives of their curriculums while taking account of social needs, and to implement reform measures focusing on the reinforcement of systematic development of school curriculums so as to enable graduate schools to create systematic educational programs and thoroughly manage the degree-conferment process. Therefore, since fiscal 2005, MEXT has been implementing a program called "Initiatives for Attractive Education in Graduate Schools," which aims to support ambitious and innovative educational initiatives.

(3) Drafting of initiatives related to reform of graduate school education

In accordance with the Central Council for Education's recommendation paper entitled "Graduate School Education in a New Age (September 5, 2005) and the Science and Technology Basic Plan (decided by the Cabinet on March 28, 2006), MEXT on March 30, 2006 formulated a platform for the promotion of graduate school education which features systematic and intensive efforts toward enhancing graduate schools over a five-year period. This sets the direction of reform toward 1) realization of effective graduate school education, 2) assurance of conformity to international standards and credibility and 3) establishment of education and outstanding research centers that are competitive internationally. MEXT is implementing measures for making Japanese universities attractive across borders based on this platform.

(4) Expansion of financial support for doctoral program students

In order to secure excellent researchers, it is necessary to enable talented students to proceed to the second stage of doctoral programs without overly worrying about the financial burden involved. Therefore, the Third Science and Technology Basic Plan aims to enable about 20% of students in doctoral programs to receive financial support equivalent in amount to their living expenses.

To this end, MEXT has enhanced, as a priority, support for doctoral program students that is provided through the JSPS Research Fellowship for Young Scientists of the Japan Society for the Promotion of Science and expanded the amount of competitive funds that can be used to found teaching assistantship programs (TA), which lets graduate students assist educational activities, and the research assistantship (RA) program, which allows doctoral program students to participate in research projects conducted by universities.

MEXT is also implementing the scholarship program of the Japan Student Services Organization, which loans scholarships to exceptional students who need financial assistance with their studies in order to nurture personnel with the will and ability to lead the next generation.

3.3.1.3 Development of Human Resources that Meet Social Needs

(1) Human resource development conducted through industry-academia collaboration

For Japan to maintain its prowess in industrial technologies and achieve sustainable development, it is important to develop, by taking account of the needs of the society including the industrial sector, human

[22] Faculty development: Institutional efforts by the teaching staff to enhance the contents and method of education.

resources that meet such needs and that can adapt to change in the needs. To do so, it is essential that universities and companies form cooperative relations for human resource development and coordinate their activities.

Therefore, MEXT supports the development and implementation of educational programs conducted through industry-academia collaboration. Since fiscal 2006, it has been implementing the "Progressive education program for IT specialist training" so as to support the establishment, at graduate schools, of bases for fostering personnel who are equipped with expert skills required for world-top-class IT engineers and capable of adapting themselves to change in social conditions with foresight and in a flexible manner, and playing a leading role at companies.

Under the "long term internship program for graduate students," which started in fiscal 2005, MEXT is continuing to support the development and implementation of long-term high-quality internship programs through which universities and companies collaborate to develop human resources that will be able to play the central role in research and corporate activities in the future.

In addition, in order to enable doctoral degree holders to play an active role in various sectors of the society by taking advantage of their professional expertise, universities, companies, academic societies, etc. have formed a network intended to extend organized support to and cultivate a favorable environment for the diversification of career paths by providing places for meetings and exchanges for young researchers and companies and by giving career guidance under the "project to promote diversification of career paths for science and technology-related human resources."

The Ministry of Economy Trade and Industry is implementing measures for fostering personnel capable of undertaking management of technology (MOT) and for cultivating an environment for such personnel to play an active role. Specifically, it is engaged in the development and demonstration of programs (syllabi, teaching materials, teaching notes) for fostering MOT personnel capable of leading innovation, and it is also considering teaching methods. Moreover, in order to diffuse and establish MOT and foster MOT personnel, the ministry has held symposiums and considered how to evaluate and certify programs for the fostering of educators so as to assure the quality thereof.

In 2007, the baby boomers will begin reaching retirement age, so development of technical human resources supporting SMEs is important with respect to maintaining and strengthening the competitiveness of Japan's industries. To this end, practical training of young engineers/technicians based on the needs of local SMEs, making use of the equipment, know-how, etc., possessed by technical colleges, etc., were supported.

Meanwhile, in response to the aging of experienced personnel, sophistication of and increasingly short life cycles of technologies used at manufacturing sites, the ministry is endeavoring to develop programs to foster personnel with practical skills and establish a mechanism for such training through industry-academia collaboration from the viewpoint of the industrial sector, in order to maintain the "on-site expertise" that forms the basis of the manufacturing industry's competitiveness. So far, in a total of 46 projects, the ministry has systematized knowledge and skills required at manufacturing sites and engaged in the development and testing of programs to train personnel to acquire practical skills through industrial activity. With the training programs thus developed starting gradually, efforts toward the development of core human resources are proceeding steadily.

(2) Promotion of activities of doctoral degree holders

Amid the deepening and diversifying relationship between science and technology and society, it is desirable that postdoctorals and other personnel with expertise in science and technology play an active role not only at universities and research organizations but also in various sectors of society such as the industrial sector and administrative agencies.

However, it has been pointed out that such personnel have not been given sufficient opportunities to do so because the career path after a post-doctoral period is uncertain under the present circumstances.

Therefore, since fiscal 2006, MEXT has been implementing the "project to promote diversification of career paths for science and technology-related human resources," which extends organized support to and cultivates a favorable environment for the diversification of the career paths of postdoctorals. In this project, universities, companies, academic societies, etc. form a network so as to provide a "meeting place" for young researchers, offer career consulting, and implement capability-development programs such as internships. Currently, eight organizations are participating in this project.

The National Institute of Advanced Industrial Science and Technology (AIST) employed three Doctoral degree

holders (two of whom were retained from fiscal 2005) for joint research activities under a coordination/collaboration agreement with Sumitomo Electric Industries, Ltd. that seeks primarily to develop human resources capable of making contributions to companies immediately. In addition, AIST provided training to enable doctoral degree holders belonging to AIST to acquire knowledge essential for working in the industrial sector through 21 training courses, and held twice a corporate briefing conference with the participation of about 10 major companies in order to provide opportunities for information exchanges.

(3) Development of diverse human resources that lead utilization of knowledge and feedback to society

(Development of human resources related to intellectual properties and management of technology)

In order to promote the creation of innovations, it is necessary to develop human resources capable of creating, protecting and utilizing intellectual properties and those capable of effectively leading the results of research and development to the creation of market value based on understanding of both technology and business management.,

MEXT is promoting voluntary efforts by universities in this regard by supporting educational projects related to intellectual properties. For the purpose of fostering personnel with advanced expertise in areas such as management of technology, professional schools with a total of 140 majors were in place as of April 2006 (3.3.3).

(Fostering "science communicators")

According to the Public Opinion Poll on Science & Technology and Society (February 2004) conducted by the Cabinet Office, many people recognize a lack of information related to science and technology and regard information they receive as difficult to understand. In order to address this situation, it is necessary to foster and promote the activities of "science and technology communicators," personnel suited for promoting communications between scientists/engineers and ordinary people by explaining science and technology in an easy-to-understand manner and by conveying the concerns of the society to scientists/engineers.

MEXT supports universities that are to established courses intended to train science and technology communicators through the Fostering Talent in Emergent Research Fields program, which is funded by Special Coordination Funds for Promoting Science and Technology. The National Science Museum and the National Museum of Emerging Science and Innovation are making active efforts to foster science and technology communicators and promote their activities, through the "science communicator training course" and the "science communicator training program," respectively.

(Fostering Engineers)

To become a science and technology-based country, it is necessary to create industrial frontiers and strengthen international competitive power through technological innovation, as well as to strengthen the technological foundation. For this purpose, efforts are being made to foster sufficient leading engineers through the following policies.

1) Professional Engineer System

The Professional Engineer System was established with the enactment of the Professional Engineer Law in 1957 (revised in 1983). It aims to contribute to the improvement of science and technology and the development of the national economy through sound engineering, by conferring the qualification of "Professional Engineer" on those who possess advanced and specialized abilities in applying science and technology to planning and design work.

Those who apply to become a Professional Engineer are required to pass the national examination that is given in 21 fields of specialization, and become registered as a Professional Engineer. The examinations are held annually for both Professional Engineer and Associate Professional Engineer (Engineer in Training). In FY2006, the test resulted in 9,707 individuals being certified as Associate Professional Engineers, and 3,205 being certified as Professional Engineers. As of the end of December 2006, there were a total of 19,791 people registered as Associate Professional Engineers, and 58,773 registered as Professional Engineers. The distribution by sector is shown in Figure 3-3-4.

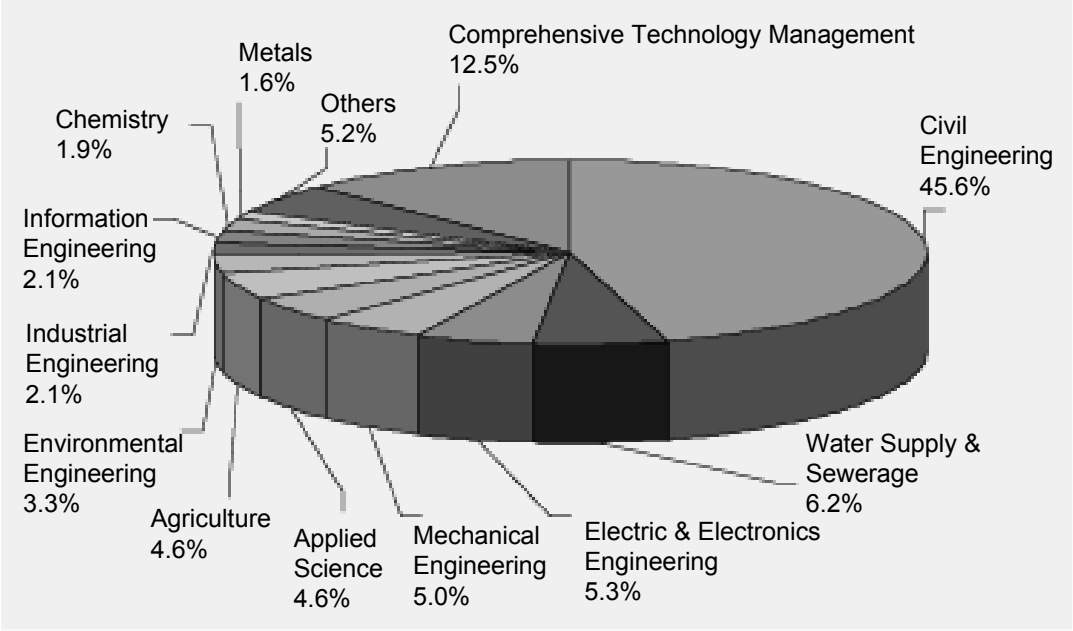


Figure 3-3-4 The distribution of professional engineers by the field of specialization (as of the end of December 2006)

2) Mutual Exemption of Engineering Qualification

Based on the Osaka Action Agenda adopted at the APEC summit meeting of 1995, work has been progressing on the "APEC Engineer Mutual Recognition Project" for the promotion of mutual acceptance of engineer qualifications within the APEC region. Japan has actively participated in studies for this project, toward the realization of mutual recognition of the Professional Engineer qualification with corresponding qualifications overseas.

In November 2000, the "APEC Engineer Manual" was published based on the results of studies at APEC. As of December 2006, there were 13 participating economies in the register, including Japan.

3) Others

Seminars are held for elementary and lower secondary school pupils in order to foster their creativity and encourage them to be interested in intellectual properties by giving them first-hand experiences of craftsmanship while providing them with knowledge related to intellectual properties. In addition, efforts are underway to encourage students at technical, commercial and agricultural upper secondary schools as well as at technical colleges to acquire skills while learning about the intellectual property system. There is also an initiative to encourage students at upper secondary schools, technical colleges and universities to engage in craftsmanship while growing familiar with the intellectual property system through participation in a "patent contest," which allows participants whose inventions are recognized as excellent to get first-hand-experiences of patent procedures such as patent application and acquisition.

The "program to foster expert engineers" was continued from fiscal 2005 in order to train engineers to acquire advanced expertise useful for research and development by utilizing the diverse range of research activities conducted at the National Institute of Advanced Industrial Science and Technology (AIST) and the cutting-edge research infrastructure of the institute.

3.3.1.4 Broadening Base of Science and Technology-Related Education

Expert members of the Council for Science and Technology Policy submitted a report entitled "Toward Drastically Enhancing Science and Mathematics Education" at a meeting in April 2006. This report called for deliberations on and implementation of measures to enhance various strategic initiatives including the fostering of top-level personnel, the use of outside experts to strengthen the teaching staff and improve school education, training of science and technology communicators and the enhancement of outreach activities of research organizations, and its recommendations were reflected in the budgets of government ministries and agencies for fiscal 2007.

(1) Fostering children brimming with intellectual curiosity

In order to increase the number of children fond of science and mathematics and foster children brimming with intellectual curiosity, it is necessary to cultivate a favorable environment for children at elementary and secondary schools to become familiar with and learn about science and technology.

Therefore, in order to develop the next generation of science and technology-related human resources, MEXT is implementing the following initiatives for enhancing science and mathematics education by cultivating a favorable environment for children to become familiar with science and technology and thereby expand the room for enhancing their capabilities.

(Science and Mathematics Literacy Enhancement Model Area Program)

The Japan Science and Technology Agency in fiscal 2006 is providing support to initiatives, based on proposals from local governments actively promoting science and mathematics education and is implementing this in 20 model regions, for fostering the intellectual curiosity of school pupils and students about science and their inquiring spirit, and their cultivating scientific viewpoints and perspectives. Specifically, these initiatives include the development and utilization of localized science and mathematics education materials based on the collaboration of schools, universities, science museums, etc. and the cooperation of teachers, museum employees and researchers, etc. within the regions concerned. There are also initiatives that involve local volunteer activities.

(Science Partnership Project)

The Japan Science and Technology Agency is implementing the "Science Partnership Project (SPP)," which supports initiatives implemented through collaboration between schools, supervisory organizations such as education boards, and universities, science museums, etc. to provide hands-on education and problem-solving education in order to enhance the interest of pupils and students in science and technology and mathematics, and to foster their inquiring spirit. Specifically, these initiatives include educational activities such as observations and experiments supervised by researchers, training of teachers for such lessons, science camps for hands-on science and technology lessons at universities and research organizations, etc. (A total of 767 such education courses are provided in fiscal 2006.).

(Enhancement of facilities and equipment for science and mathematics education)

Efforts are underway, based on the Act for Promotion of Science Education, to systematically enhance the facilities and equipment used in science and mathematics education at elementary, secondary and upper secondary schools, as they are insufficient in number and outdated in many cases.

(Development of advanced digital materials for science and technology education)

The Japan Science and Technology Agency is engaged in the development of advanced digital materials for science and technology education by taking advantage of the most up-to-date research achievements so as to enhance science and technology education as well as in R&D activities related to systems to be supplied to schools.

The agency provides digital education materials to schools nationwide through the Internet and conducts, through nine joint research organizations (education boards, education centers, etc.) that were selected through public offering, demonstration tests and evaluation related to the utilization of such materials at schools.

(Others)

In light of a sharp decline in the vitality of children, on whose shoulders Japan's future rests, the Science Council of Japan has established the "Committee for Studying Strategy and Policy for Better Growing Environment to Promote Children's Vitality," which is conducting cross-sectoral deliberations on basic policies concerning the formulation of national strategies.

(2) Development of talented children's individuality and capabilities

In order to develop the individuality of children interested in science and mathematics and foster personnel with outstanding proficiency in science and technology, MEXT is implementing the following initiatives:

(Super Science High Schools (SSHs))

Since fiscal 2002, MEXT has been steadily promoting the development of science and technology-related human resources capable of playing an active role internationally by designating schools that focus on science and mathematics education as "Super Science High Schools." Specifically, efforts are underway to provide advanced science and mathematics education in collaboration with universities, and develop curriculums with an emphasis on science and mathematics. In fiscal 2006, 99 High schools nationwide engaged in unique efforts in this regard.

(International Science and Technology Contests)

The Japan Science and Technology Agency is providing supports to activities that encourage students, mainly high-school students or younger children, to participate in international science and technology contests in seven fields-mathematics, chemistry, biology, physics, information, robot and theme research-in order to provide students interested in science and mathematics with opportunities to experience advanced learning. The agency thereby aims to enhance students' learning motivation, expand their capabilities, and develop science and technology-related human resources capable of making global contributions. Japanese students made excellent achievements in the International Mathematical Olympiad in fiscal 2006, for example. (Table 3-3-5).

(Interconnection between upper secondary schools and universities)

It is important to develop the individuality and capabilities of talented pupils and students, and improvement in the interconnection between upper secondary schools and universities is essential for that. In this regard, in fiscal 2006, about 60% of universities adopted the admission office (AO) entrance examination, which evaluates the applicants' abilities, aptitudes and motivation in a comprehensive manner. Moreover, upper secondary school-university interconnection initiatives that enable upper secondary school students to gain first-hand experiences of university education and research have been increasing year after year, including catering lessons, which refers to the provision of lessons by university teachers in the classrooms of upper secondary schools, and acceptance of upper secondary school students into university courses.

Table 3-3-5 Medalists in International Science Olympiads in 2006

International Mathematical Olympiad		
Gold medalist	3rd grade, upper secondary school (Tokyo)	Yuta Ohashi
Gold medalist	3rd grade, upper secondary school (Tokyo)	Masaki Watanabe*
Silver medalist	3rd grade, upper secondary school (Hyogo)	Yuki Ito
Silver medalist	2nd grade, upper secondary school (Mie)	Toshiki Kataoka*
Silver medalist	2nd grade, upper secondary school (Hyogo)	Yuki Yoshida
Bronze medalist	2nd grade, upper secondary school (Tokyo)	Teruhisa Koshikawa
International Olympiad in Informatics		
Gold medalist	3rd grade, upper secondary school (Tokyo)	Masaki Watanabe*
Gold medalist	2nd grade, upper secondary school (Mie)	Toshiki Kataoka*
Bronze medalist	3rd grade, upper secondary school (Hyogo)	Kentarou Imajo
International Chemistry Olympiad		
Gold medalist	3rd grade, upper secondary school (Hyogo)	Asako Imamura
Silver medalist	3rd grade, upper secondary school (Tokyo)	Toshiaki Nagata
Silver medalist	3rd grade, upper secondary school (Tokyo)	Yohei Hattori
Silver medalist	2nd grade, upper secondary school (Tokyo)	Naru Tanaka
International Physics Olympiad		
Silver medalist	3rd grade, upper secondary school (Kyoto)	Tatsuyuki Hikita
Bronze medalist	3rd grade, upper secondary school (Tokyo)	Yoshiki Tanaka
Bronze medalist	3rd grade, upper secondary school (Fukuoka)	Yuya Tanizaki
Bronze medalist	3rd grade, upper secondary school (Kagoshima)	Takashi Nozoe
International Biology Olympiad		
Bronze medalist	3rd grade, upper secondary school (Tokyo)	Hirofumi Sato
Bronze medalist	2nd grade, upper secondary school (Tokyo)	Ryo Kariyazono
Bronze medalist	1st grade, upper secondary school (Kanagawa)	Manatsu Hamazaki

Students with the mark "*" won medals in both International Mathematical Olympiad and International Olympiad in Informatics.

3.3.2 Creating Scientific Development and Persistent Innovation

The Cabinet Office is in the process of formulating long-term strategic guidelines called "Innovation 25," which would seek to unlock the future potential of mankind and create a constant stream of innovations, which will serve as the prime mover of growth, over the years through 2025. In February 2007, an interim report was compiled so as to indicate how people's lives will be changed by innovations in 20 years in terms of safety and convenience and what kind of innovations Japan should aim to create.

Meanwhile, the Council for Science and Technology Policy formulated the "Strategies to Create Innovation," which called for the government to (1) enrich the sources of innovation, (2) enhance the mechanism for growing the seeds of innovation into fruits, (3) strengthen policy measures for achieving the fruition of innovation, (4) promote institutional reforms intended to create innovation and (5) enhance the development of human resources that lead innovation, and submitted it to the ministers concerned (June 14, 2006).

Following a request from the Minister of State for Innovation, the Science Council of Japan established the "Committee for the Investigation of Innovation Promotion" so as to make contributions to the government's formulation of the Innovation 25 strategic guidelines. The Committee has conducted studies from comprehensive viewpoints of various academic fields, and published a report entitled "The Future Society Envisioned by the Science Community" on January 25, 2007. This report puts forward recommendations as to what kinds of innovations should be achieved in what fields and as to the infrastructure necessary for the envisioned innovations.

The Ministry of Economy, Trade and Industry, in line with the Outline of Economic Growth Strategies is promoting the "Innovation Superhighway" plan (formulated by the Council on Integrated Fiscal and Economic Reform on July 6, 2007), which seeks to establish a mechanism for quickly leading R&D achievements to commercialization in cutting-edge R&D projects by utilizing inter-ministry collaboration, fusion of different research fields, basic scientific research and international standardization.

3.3.2.1 Developing a Competitive Environment

(1) Increasing competitive funds and indirect costs

The competitive funds, which contribute to creating a competitive research and development environment, was increased, with the amount of funds granted increasing to 470.1 billion yen under the fiscal 2006 budget (467.2 billion yen under the fiscal 2005 budget). Also expanded was the indirect costs grant scheme, in which a fixed percentage of the research grant is allocated to institutions that employ researchers who have won the competitive funds in proportion to the research expenses and is thus effective in promoting competition among research organizations, with 31 of the 36 competitive funds available allocating 30% of the research funds and three other programs also allocating funds in some cases.

Table 3-3-6 below shows competitive funds sponsored by government ministries and agencies.

Table 3-3-6 Comprehensive table of competitive funds

Name of ministry/ agency	Sponsoring institution	Name of program	Program outline	Budget in FY2005 (million yen)	Budget in FY2006 (million yen)
Cabinet Office, Government of Japan	Cabinet	Program for Promotion of Industry-University-Government Joint Research in Okinawa	To support industry-academia-government joint R&D projects conducted in the biotechnology, environment, food processing sectors, etc. by taking advantage of Okinawa's resources and characteristics in order to contribute to the creation of new businesses and the promotion of local industries.	401	277
Cabinet Office, Government of Japan	Cabinet	Research on Technology for Assessing Food Health Risks	To promote research related to the development of guidelines for risk evaluation and evaluation of standards in order to effectively conduct scientific evaluation of effects of foods on health (risk evaluation) with regard to a variety of potentially harmful food-related factors such as food additives, chemical substances, bacteria, viruses and prions.	123	244
Subtotal				524	521
Ministry of Internal Affairs and Communications	Ministry	Strategic Information and Communications R&D Promotion Programme	To actively promote unique and novel R&D projects in line with strategic priority targets in order to enhance R&D capabilities regarding information and communications technologies, raise the quality of researchers through the establishment of a competitive research environment and create intellectual properties with global excellence.	3,181	3,209
Ministry of Internal Affairs and Communications	National Institute of Information and Communications Technology	Program for Promotion of Basic Research in the Information and Communications Sectors	To implement unique and novel R&D projects in order to enhance R&D capabilities regarding information and communications technologies and raise the quality of researchers through the establishment of a competitive research environment. (This program was terminated in fiscal 2005.)	206	—
Ministry of Internal Affairs and Communications	National Institute of Information and Communications Technology	Advanced technology development for pioneering new communications and broadcasting areas (Telecom incubation)	To create new businesses in the communications and broadcasting sectors by supporting private-sector companies, including venture companies, that are engaged in R&D activities related to advanced technologies.	640	620
Ministry of Internal Affairs and Communications	National Institute of Information and Communications Technology	Program for Promotion of Private-Sector Basic Technology Research	To invite proposals for experiment and research themes related to communications and broadcasting technologies from the private sector and entrust private-sector companies with experiments and research concerning selected themes in order to promote experiments and research that will contribute to strengthening the foundation of the national economy and people's lives.	10,300	7,200
Ministry of Internal Affairs and Communications	Fire and Disaster Management Agency	Program for Promotion of Science and Technology Research for Fire Safety and Disaster Prevention	In order to promote science and technology related to prevention/mitigation of fires and other disasters with a view to realizing a safe and comfortable society, it is necessary to conduct research focusing on actual disaster prevention/mitigation activities while broadening the base of relevant technologies and promoting industry-academia-government coordination and research activities by local governments. Therefore, this competitive funding program seeks to promote R&D for the purpose of putting new technologies to practical use by allocating research funds to excellent research themes related to 1) the advancement of science and technology concerning firefighting, rescue and relief activities, 2) the promotion of computerization of information concerning anti-disaster measures and 3) the protection of the environment.	370	350
Subtotal				14,696	11,379
Ministry of Education, Culture, Sports, Science and Technology	Ministry, Japan Society for the Promotion of Science	Grants-in-Aid for Scientific Research	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 researcw.The program supports creative and pioneering research that passes a peer review(Notes 1) process.	188,000	189,500
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Basic Research Programs	To promote basic research related mainly to "Strategic Prioritized Science and Technology" items in line with "Strategic Sector" set by the government in light of social and economic needs, with a view to further advancing science and technology and developing technologies that will lead to the creation of new industries.	47,595	47,976
Ministry of Education, Culture, Sports, Science and Technology	Ministry	Special Coordination Funds for Promoting Science and Technology	This competitive funding scheme, which is managed by MEXT in line with policies set by the Council for Science and Technology Policy, promotes pioneering and cross-sectoral initiatives in order to achieve policy objectives under the Science and Technology Basic Plan. In fiscal 2006, two new programs, "Young Researchers' Independent Research Environment Support Program" and "Advanced Interdisciplinary Innovation Research Center Program" were established under this scheme, with proposals for research plans invited publicly.	39,500	39,800

Name of ministry/ agency	Sponsoring institution	Name of program	Program outline	Budget in FY2005 (million yen)	Budget in FY2006 (million yen)
Ministry of Education, Culture, Sports, Science and Technology	Ministry	21st Century COE Program	To make Japanese universities internationally competitive and raise their quality to the world's top level by providing targeted support for the establishment of global research and educational centers by national, public and private universities under the principle of competition based on third-party evaluation.	38,171	37,800
Ministry of Education, Culture, Sports, Science and Technology	Ministry	Promotion of R&D for Key Technologies	To promote 1) R&D in life sciences based on social needs, 2) R&D related to the establishment of the next-generation IT infrastructure, 3)Promotion of Novel Interdisciplinary Fields Based on Nanotechnology and Materials and 4) interdisciplinary research programs, in order to advance R&D concerning the key technologies that form the basis of activities for securing the safety and security of Japan and developing the country's economy.	7,869	8,402
Ministry of Education, Culture, Sports, Science and Technology	Ministry	Plan for Promotion of Global Observation Systems	To conduct technology development and observational research in fields where Japan should play the leading role, based on proposals selected from among those submitted in response to public invitations, with a view to the establishment of a global observation system advocated by the Earth Observation Summit.	1,017	849
Ministry of Education, Culture, Sports, Science and Technology	Ministry	Innovative Nuclear Research and Development Program	To implement, amid a competitive environment, R&D related to nuclear reactor and fuel cycle technologies targeted for promotion by the government and basic research related to such technologies, with a view to realizing a inivaive nuclear system. Research proposals related to basic research are invited from young researchers.	12,145	6,267
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Development of Systems and Technology for Advanced Measurement and Analysis	To promote the development of pioneering measurement/analysis techniques and equipment that support unique and world-top-class research activities. In particular, this program aims to promote industry-academia-government joint development in applications fields (manufacturing fields) with the participation of users with regard to projects undertaken by the JST for the development of cutting-edge measurement/analysis techniques and equipment.	4,000	4,200
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Research Program on Development of Innovative Technology	This program, which takes over from the Public Proposal System for Original and Innovative Technology Development Research program, terminated in fiscal 2006, with a view to ushering in new industries, invites from researchers working for private-sector institutions research theme proposals regarding innovative and unique technologies that will form the foundation of Japan's prosperity in the 21st century, and seeks to develop innovative practical technologies by taking advantage of excellent research themes selected from among those submitted.	3,208	2,615
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Support System for Creation of University-Derived Venture Companies	To promote R&D projects for the foundation of venture companies and the implementation of new businesses based on research results achieved by universities, thereby facilitating the feedback of the research results to the society and economy. (This program was terminated in fiscal 2005)	25	—
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Project to develop "Innovative Seeds"	To seek to contribute to the development of the society and economy as well as science and technology and to the improvement of people's living standards by facilitating feedback to the society of unique research results (seeds) obtained by universities, public research institutes, etc. by conducting R&D in a manner suited to the relevant technology phase amid a competitive environment so as to promote the commercialization of the results (foundation of university-based venture companies and technology transfers).	9,674	9,479
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Collaborative Development of Innovative Seeds	To provide opportunities to identify potential technology seeds that may be hidden in the realm of basic research from the viewpoint of the industrial sector and conduct industry-academia joint feasibility studies (Note 2) with a view to bringing such seeds into the open. The seeds thus revealed are to be developed further through industry-academia joint research (with the use of the matching-fund format) in order to help to create innovations.	—	1,400
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Science and Technology Incubation in Advanced Regions	To undertake coordinating work necessary for the creation of regional new industries and promote joint research for the purpose of industrialization so as to take advantage of research results achieved by universities, with JST innovation plazas and JST satellites used as footholds for such activities.	4,980	5,973
Ministry of Education, Culture, Sports, Science and Technology	Japan Science and Technology Agency	Regionally Concentrated R&D Progam, etc.	To promote industry-academia-government joint research with focus on specific research themes in fields where there are particularly strong regional needs for the foundation of start-up companies. To be conducted under this program are R&D activities for the purpose of fostering new technologies and new businesses, including the development of prototypes based on technology seeds created through basic research conduced by universities, etc.	4,675	4,147
Subtotal				360,859	358,408

Name of ministry/ agency	Sponsoring institution	Name of program	Program outline	Budget in FY2005 (million yen)	Budget in FY2006 (million yen)
Ministry of Health, Labour, and Welfare	Ministry	Health and Labour Sciences Research Grants	To provide subsidies to researchers engaged in the fields of health and welfare at universities and national and private research institutions. Under this program, research subjects are classified into 18 categories in four fields. In order to support research themes adopted, comprehensive research is to be promoted through the implementation of projects for nurturing and utilizing young researchers at public interest corporations.	38,187	39,789
Ministry of Health, Labour, and Welfare	Pharmaceuticals and Medical Devices Agency	Program for Promotion of Basic Research in the Health Care Sector	To provide operating funds to the National Institute of Biomedical Innovation in order to promote basic research related to the development, based on technology seeds created by universities, of pharmaceutical products that will contribute to the maintenance and advancement of good health of Japanese people in light of the fact that the importance of basic research is growing due to the recent advance of science and technology in the medical and health fields.	2,224	7,498
Subtotal				40,411	47,287
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	To promote unique basic research through invitation of research proposals from incorporated administrative agencies, universities, private-sector companies, etc. in order to create, from a fresh viewpoint, new technologies and new industrial sectors that make full use of biological functions, thereby helping to improve Japan's food self-sufficiency rate and resolve the problem of global food shortage.	4,455	4,788
Ministry of Agriculture, Forestry, and Fisheries	Bio-oriented Technology Research Advancement Institution	Research and Development Program for Bio-Industry Initiatives	To develop innovative technologies through industry-academia-government joint research projects that involve researchers in different fields in order to promote the creation of new industries and the foundation of start-up companies based on biotechnology and other bio-related advanced technologies. This program also provides support for R&D activities by researchers at incorporated administrative agencies, private-sector companies, etc. that aim to found bio-venture companies based on unique ideas and research results.	2,670	2,337
Ministry of Agriculture, Forestry, and Fisheries	Ministry	Research project for utilizing advanced technologies in agriculture, forestry and fisheries	To promote R&D closely related to production, distribution and processing in the agriculture, forestry and fisheries sectors through invitation of R&D proposals.	3,823	4,872
Ministry of Agriculture, Forestry, and Fisheries	Ministry	Program for new technology development to activate agriculture,forestry,fisheries and food industry by cooperating industry,academia and the governmen （*Fiscal 2005: Subsidies for private-sector research in the agriculture, foretry, fisheries and food sectors)	To promote R&D projects jointly conducted by private-sector companies and public research organizations, including universities and incorporated administrative agencies, in order to create new industries and businesses in the agriculture, forestry, fisheries and food sectors and resolve immediate policy challenges.	1,425	988
Subtotal				12,373	12,985
Ministry of Economy, Trade, and Industry	New Energy and Industrial Technology Development Organization	New Energy and Industrial Technology Development Organization	To invite research theme proposals from young researchers at universities, incorporated administrative agencies, etc., select unique and innovative proposals based on rigorous third-party evaluation and provide funds to the individual researchers concerned in order to discover technology seeds and develop human resources that meet the needs of the industrial sector as well as the society from the viewpoint of enhancing Japan’s prowess in industrial technology.	6,164	6,549
Ministry of Economy, Trade, and Industry	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)	To provide matching funds, through TLOs (technology licensing organizations) in charge of R&D management, to cover part of the cost of industry-academia joint R&D projects aiming for commercialization of research results achieved by universities on condition that the companies involved provide part of research funds and that there are clear business plans.	3,162	3,383
Ministry of Economy, Trade, and Industry	Ministry	Consortium R&D Project for Regional Revitalization	To establish regional systems for industry-academia-government joint research (Regional Rebirth Consortium) by taking advantage of technologies developed by universities, and conduct advanced R&D activities with commercialization in mind.	13,720	16,292
Ministry of Economy, Trade, and Industry	Ministry	Innovative and Viable Nuclear Energy Technology (IVNET) Development Project	To identify research themes that will lead to the practical use of unique and innovative technologies by publicly inviting proposals, and conduct technology development for the purpose of improving the safety and economy of nuclear power generation and the nuclear fuel cycle.	2,183	1,900
Ministry of Economy, Trade, and Industry	Japan Oil, Gas and Metals National Corporation	Research for Promoting Development/Utilization of Oil/Natural Gas	To conduct research, spanning from basic research to applications research, based on proposals selected from among those submitted in response to public invitations of proposals for unique and innovative technologies concerning oil and natural gas exploration and development.	4,586	2,392
Subtotal				29,815	30,516

Name of ministry/ agency	Sponsoring institution	Name of program	Program outline	Budget in FY2005 (million yen)	Budget in FY2006 (million yen)
Ministry of Land, Infrastructure, and Transport	Japan Railway Construction, Transport and Technology Agency	Program for Promoting Fundamental Transport Technology Research	To seek to establish entirely new technologies that will contribute to the safety of traffic, the preservation of the environment and the development of advanced traffic services by publicly inviting unique and innovative research theme proposals.	444	429
Ministry of Land, Infrastructure, and Transport	Ministry	R&D fund support program for the development of construction technology	To provide subsidies to researchers at universities, research organizations, etc. in order to promote activities for technological innovations in a broad range of interdisciplinary fields through collaboration between the construction and non-construction sectors.	350	400
Subtotal				794	829
Ministry of the Environment	Ministry	Global Environmental Research Fund	To seek to contribute to the preservation of the global environment in light of the serious impact of global environmental problems on the existence of humanity, by bringing together the talents of researchers in various fields so as to promote comprehensive investigations and research from interdisciplinary and global viewpoints.	3,015	3,256
Ministry of the Environment	Ministry	Environmental Research and Technology Development Fund	To conduct thorough research, right from the basic research stage, on unresolved environmental problems, develop technologies expected to be put to practical use in a relatively short period of time and conduct R&D regarding a research theme entitled "Technology Research for Creation of Natural Symbiosis Basin and Urban Regeneration Technology," which was designated as a priority item by the Council on Science and Technology Policy.	815	881
Ministry of the Environment	Ministry	Ministry of the Environment Waste Management Research Grants	To seek to resolve various problems related to waste by promoting research and technology development regarding the reduction of waste through curbs on waste discharges and recycling and regarding appropriate ways of disposing of waste that will contribute to the establishment of a recycling-oriented society.	1,150	1,300
Ministry of the Environment	Ministry	Project for Development of Technology for Global Warming Countermeasures	To develop and put to practical use effective basic technologies for reducing emissions of energy-derived CO2, such as those related to energy conservation and alternative energy sources, based on proposals invited from entities equipped with the ability to implement technology development and with the necessary facilities and equipment.	2,676	2,716
Subtotal				7,656	8,153
Total				467,128	470,078

* The sum of budget figures may not add up exactly to the total figures at the bottom of the table due to rounding effects.
(Notes)
1. Peer review: review by researchers in some fields similar to the specialized fields.
2. FS (feasibility study): an experiment or an investigation conducted to examine whether a planned project can be carried out successfully.
3. Matching fund format: a scheme in which subsidies are provided to cover the project costs to be borne by universities and other parties involved, in amount not exceeding the amount of funds provided by the companies involved.

(2) Cultivation of competitive environment within organizations

(Effective mix of basic and competitive funds at universities)

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

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

(3) Implementation of institutional reform related to competitive funding

The Council for Science and Technology Policy in December 2006 published a report entitled "Regarding Promotion of Science and Technology and Institutional Reform for Feedback to Society," which called for the clarification of the reasons for carryover of funds, an increase in research funds and the speed-up of fund disbursement so as to realize fair and efficient use of research funds.

In this context, a notice regarding the Grants-in-Aid for Scientific Research program, sponsored by MEXT, was issued to the research organizations concerned in April 2006 so as to clarify how carryover of funds should be handled by providing many examples of such carryover and ensure appropriate utilization of funds. At the same time, MEXT reformed this research funding program in fiscal 2006 so as to enable annual multiple applications on a trial basis. Meanwhile, with regard to the Health and

Labour Sciences Research Grants and the program to promote basic research in healthcare fields, both sponsored by the Ministry of Health, Labour and Welfare, reform measures such as the clarification of the reasons for fund carryover and the speed-up of fund disbursement were implemented. Concerning the Ministry of Economy, Trade and Industry's subsidy program for industrial technology research, annual multiple applications were introduced on a trial basis and the fund disbursement was speeded up. As for the Ministry of Land, Infrastructure and Transport's subsidy program for construction technology R&D and program for basic research in the transport sector, reform measures such as the speed-up of fund disbursement were implemented.

In December 2006, the Research Fund Working Group was established under the Council for Science and Technology Policy's Expert Panel on Basic Policy so as to conduct deliberations on how to reform competitive funding programs in terms of research fund utilization, allocation and evaluation.

(Establishment of fair and transparent screening system)

When allocating competitive funds, it is important to screen proposed research plans in a fair and transparent manner and by attaching importance to both the contents of the plans and the implementation capability of the applicants. Therefore, regarding each competitive funding program, efforts are underway to implement reform measures such as increasing the number of screeners, requiring the submission of more detailed plans, revisions of screening criteria and the employment of screeners from a diverse range of fields, while endeavoring to streamline the screening activities

Regarding MEXT's Special Coordination Funds for Promoting Science and Technology, for example, the criteria for the selection of screeners were clarified in fiscal 2006. With regard to the Ministry of Health, Labour and Welfare's Health and Labour Sciences Research Grants program, national research organizations to which operations related to this program are transferred are notified of points of attention for clarifying the criteria for the selection of members of the screening committee as a way to establish a fair and transparent screening system.

(Feedback of screening results)

Regarding each competitive funding program, efforts are underway to promote disclosure of details of screening results so as to ensure appropriate feedback to researchers. In fiscal 2005, feedback of screening results including the provision of comments by screeners to unsuccessful applicants was implemented for 24 of the 36 programs available, whereas in fiscal 2006, such feedback was implemented for 28 of the 36 programs available.

(Enhancement of functions of allocation organizations)

Organizations in charge of allocating competitive funds are strengthening their institutions by appointing program officers and program directors and enhancing research and analysis functions as well as administrative functions related to screening, fund distribution and management. The Japan Society for the Promotion of Science, which is the fund allocation organization for competitive funding programs sponsored by MEXT, has established the Research Center for Science Systems, which conducts surveys and research concerning how to promote science in order to support the society's activities. The Japan Science and Technology Agency has established the Center for Research and Development Strategy, which is in charge of planning related to research fields that should be promoted as priorities. With regard to the Ministry of Health, Labour and Welfare's Health and Labour Sciences Research Grants program, the operations related to the program are being transferred to national research organizations so as to ensure that evaluation, research planning and fund allocation are conducted by taking advantage of scientific knowledge.

3.3.2.2 Enhancing Competitiveness of Universities

(1) Creation of universities with world-leading excellence in science and technology

In order to make Japanese universities competitive internationally, it is necessary to cultivate a competitive environment within them, whether they are national, public or private universities. In this context, MEXT has been implementing the 21st Century COE program since fiscal 2002, providing targeted support to the establishment world-class research and education centers through the introduction of the principle of competition based on third-party evaluation. This program is promoting university reforms such as campus-wide regeneration led by the president, revitalization of the function of fostering excellent researchers and improvement of the standard of research. "Graduate School Education in a New Age" (September 5, 2005), a recommendation report by the Central Council for Education, and the Third Science and Technology Basic Plan (decided by the Cabinet on March 28, 2006) called for the implementation of a "post-21st Century COE program as an enhanced, upgraded version of the 21st Century COE program.

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

(Making universities more open to local communities)

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

In February 2006, the Regional Revitalization Headquarters decided the "Program for Revitalizing Regional Knowledge Centers" through its collaboration with MEXT and the Council for Science and Technology Policy. This program supports voluntary initiatives implemented by local communities jointly with universities, where regions' human and intellectual resources are concentrated to form knowledge bases.

In response, the government approved 32 regional revitalization plans based on this program by March 2007. One example of such university-local community collaboration plans is the "Yamanashi Prefecture Plan for Revitalizing Winery Personnel," in which the University of Yamanashi, the Yamanashi prefectural government, the local wine industry and winery farmers collaborate to promote efforts to train winery personnel and establish local wine brands. Another example is the "Kobe Plan for Creating Health-Enjoying Community," which features an effort made by Kobe University, in collaboration with the Hyogo prefectural government, NPOs and private business operators, to promote health maintenance based on walking exercises so as to help elderly people regain vitality and prevent lifestyle diseases. In February 2007, the "Program for Revitalizing Regional Knowledge Centers" was enhanced through the introduction of new measures such as easing of the requirements for foreign researchers with advanced expertise to obtain permanent residence permits and the provision of grants for regional utilization of biomass energy. Moreover, in order to support this program, MEXT publicly invited proposals of initiatives to establish regional knowledge centers through which regional universities and the host regions would collaborate to develop excellent human resources by taking advantage of science and technology, and the Ministry provided support to excellent proposals based on regional revitalization plans approved by the government. The public invitation was conducted as part of a new program called "Regional Revitalization Human Resources Development Hub Program," funded by the Special Coordination Funds for Promoting Science and Technology. Currently, ten universities, including the University of Yamanashi are involved in regional revitalization plans.

3.3.2.3 Enhancing Systems for Creating Innovations

(1) Enhancing various research funding programs suited to various stages of research and development

(Enhancing competitive research for creation of innovations)

It is important to lead scientific discoveries and technological inventions realized by basic research beyond the confines of academic papers so as to produce social and economic values and feed back the benefits to society and people. Therefore, it is necessary to manage purpose-specific basic research and applications research programs appropriately in order to prevent them from becoming mere tools for satisfying researchers' own intellectual curiosity. In this context, the Japan Science

and Technology Agency is promoting basic research related to "Strategic Prioritized Science and Technology" items as part of its Basic Research Programs under a program officer invested with the responsibility and discretion concerning the management of research progress in order to achieve the "Strategic Sector" set by the government for the purpose of creating innovations. In addition, the agency is implementing the Collaborative Development of Innovative Seeds and Project to develop "Innovative Seeds" as applications research programs intended to feed back the research achievements to society.

In the "Program for the promotion of basic research for the creation of new technologies and new sectors" and the "Research and Development Program for Bio-Industry Initiatives," which are being implemented by the National Agriculture and Food Research Organization, the screening and evaluation committee screen proposed research plans and evaluate implemented plans based on its members' understanding of these projects' objective of contributing to the agriculture, forestry, fisheries and food industries, etc. Interim evaluation is conducted on ongoing research plans with regard to the research results so far obtained and how they should be implemented in the future. The results of the evaluation will be conveyed by program officers to the researchers concerned so as to ensure that research plans are implemented in accordance with the objective of these projects.

(Establishment of advanced research centers for interdisciplinary fields)

Based on the view that Japan should develop pioneering research fields in order to create innovations, the Third Science and Technology Basic Plan points out that it will be effective to make intensive investments, with the support of the industrial sector, for the establishment of research and education centers with emphasis on advanced research fields.

Since fiscal 2006, with the use of Special Coordination Funds for Promoting Science and Technology, MEXT has been publicly inviting proposals for the project for Advanced Interdisciplinary Innovation Research Center Program, which supports organizations endeavoring to establish centers that would conduct R&D, starting from the basic research stage, in advanced interdisciplinary fields through industry-academia collaboration with a view to achieving commercialization in the future. Currently, nine research organizations are engaged in such efforts.

(Reform of research funding programs across ministerial boundaries)

The Council for Science and Technology Policy is strengthening the management of a diverse range of research funding programs by building databases utilized for macro analysis necessary for the formulation of Science and Technology Basic Plans and research and deliberations concerning the allocation of resources.

The research funding programs sponsored by government ministries and agencies and research and development programs conducted by research organizations in the industrial, academic and government sectors cover various stages of development, from basic research to commercialization, and it is necessary to establish a mechanism that advances development across various programs and organizations right up to commercialization without a break. In fiscal 2006, the Okinawa industry-academia joint research project, sponsored by the Cabinet Office, was implemented in collaboration with projects sponsored by other government organizations under an information sharing arrangement. Under the Ministry of Health, Labour and Welfare's Health and Labour Sciences Research Grants program, there are projects which share the evaluation committee with projects sponsored by other ministries and agencies and which use the matching fund format. Practical use of research achievements is thus promoted through collaboration with projects sponsored by other ministries and agencies and through burden-sharing concerning development. Meanwhile, the Ministry of Agriculture, Forestry and Fisheries is implementing research programs intended to apply technology seeds produced by basic research conducted by other ministries and agencies and research achievements in other sectors to the agriculture, forestry and fisheries sector.

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

As the 21st century is referred to as the "century of knowledge," the creation and utilization of that knowledge is indispensable to the future development of Japan, so industrial-academia-government collaboration is an important means for producing a constant stream of innovations. Although industry-academia-government collaboration in Japan has recently made significant progress, the level of collaboration is not yet necessarily sufficient compared with the world-top-class research

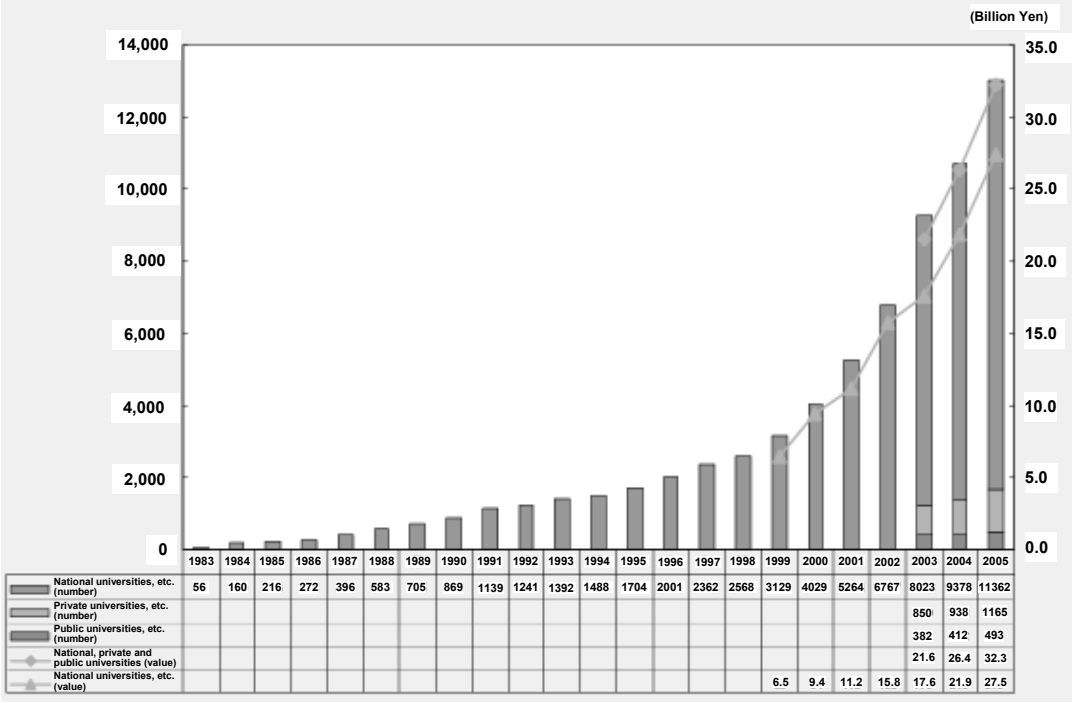
potential of Japanese universities. Therefore, it is necessary to promote industry-academia-government collaboration further, and Japan is increasing its efforts in this regard.

In June 2006, the 5th Conference on the Promotion of Collaboration between Industry, Academia and Government was held with the participation of leaders and working-level officials from companies, universities and administrative organizations across Japan, in order to further promote industry-academia-government collaboration. Representatives from the industrial, academic and government sectors delivered lecture speeches, and working-level officials from universities, research organizations and technology-licensing organizations (TLOs) conducted sector-by-sector discussions. At the conference, 11 awards, including the Prime Minister's Award, were given to parties that were involved in successful cases of industry-academia-government collaboration, including pioneering initiatives that made great contributions to such collaboration.

In November 2006, the 6th Business-Academia -Government Collaboration Summit was held under the sponsorship of the Cabinet Office, the Ministry of Internal Affairs and Communications, MEXT, the Ministry of Economy, Trade and Industry, Nippon Keidanren, and the Science Council of Japan. Leaders of universities, companies, etc. were invited to the summit to discuss how to promote industry-academia-government collaboration in the future, by broadening the concept of "innovation" as envisioned by the Third Science and Technology Basic Plan beyond technological innovation, so as to create innovations that will contribute to Japan's economic growth.

The Ministry of Economy, Trade and Industry, with the support of the New Energy and Industrial Technology Development Organization, formulated the "Strategic Technology Roadmap," which provides a vision of future needs of society and people as well as future technological progress and trends. The Ministry of Economy, Trade and Industry does not only utilize the Strategic Technology Roadmap as a tool for managing research and development but also uses it as a means to facilitate communications between people involved in planning and implementation of research and development by distributing it widely in the industrial, academic and government sectors.

The above-mentioned projects and activities are expected to contribute to the creation of innovations in Japan.



	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
National universities, etc. (number)	56	160	216	272	396	583	705	869	1139	1241	1392	1488	1704	2001	2362	2568	3129	4029	5264	6767	8023	9378	11362
Private universities, etc. (number)																					850	938	1165
Public universities, etc. (number)																					382	412	493
National, private and public universities (value)																					21.6	26.4	32.3
National universities, etc. (value)																	6.5	9.4	11.2	15.8	17.6	21.9	27.5

Figure 3-3-7 Trends in number of joint research programs implemented and value of funds received

(Deepening of industry-academia-government collaboration)

In line with the corporatization of national universities in April 2004, industry-government-academia collaboration has made steady progress, with the number of research programs implemented jointly by universities and private-sector companies, etc. exceeding 13,000 in fiscal 2005 (Figure 3-3-7). Moreover, the number of patents implemented and granted totaled 1,283 and the number of university-based venture companies totaled 1,347 as of the end of March 2006.

In order to further promote industry-academia-government collaboration in a strategic and organized manner in light of these results, the National Institute of Information and Communications Technology is conducting research on industry-academia-government collaboration through the Advanced Test bed Network for R&D, which it is building and operating.

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 April 2006, MEXT has also placed 91 coordinators in universities and technical colleges nationwide, where they serve as bridges between universities and enterprises that are conducting joint research at the universities. (Figure 3-3-8)

The Ministry of Agriculture, Forestry and Fisheries is promoting research intended to realize commercialization and industrial use of technology seeds owned by incorporated administrative agencies through its agribiotechnology commercialization/industrialization research program. At the same time, the ministry is holding agribusiness creation fairs in Tokyo and other locations in order to provide meeting places for companies, universities, incorporated administrative agencies and administrative agencies so that they can find business opportunities for research, product development, commercialization, technology transfers and new market entry in the agriculture, forestry, fisheries and food sectors. Moreover, regional consultation forums on biotechnology are held mainly under the sponsorship of regional agricultural administration offices and regional agricultural research centers and with the participation of

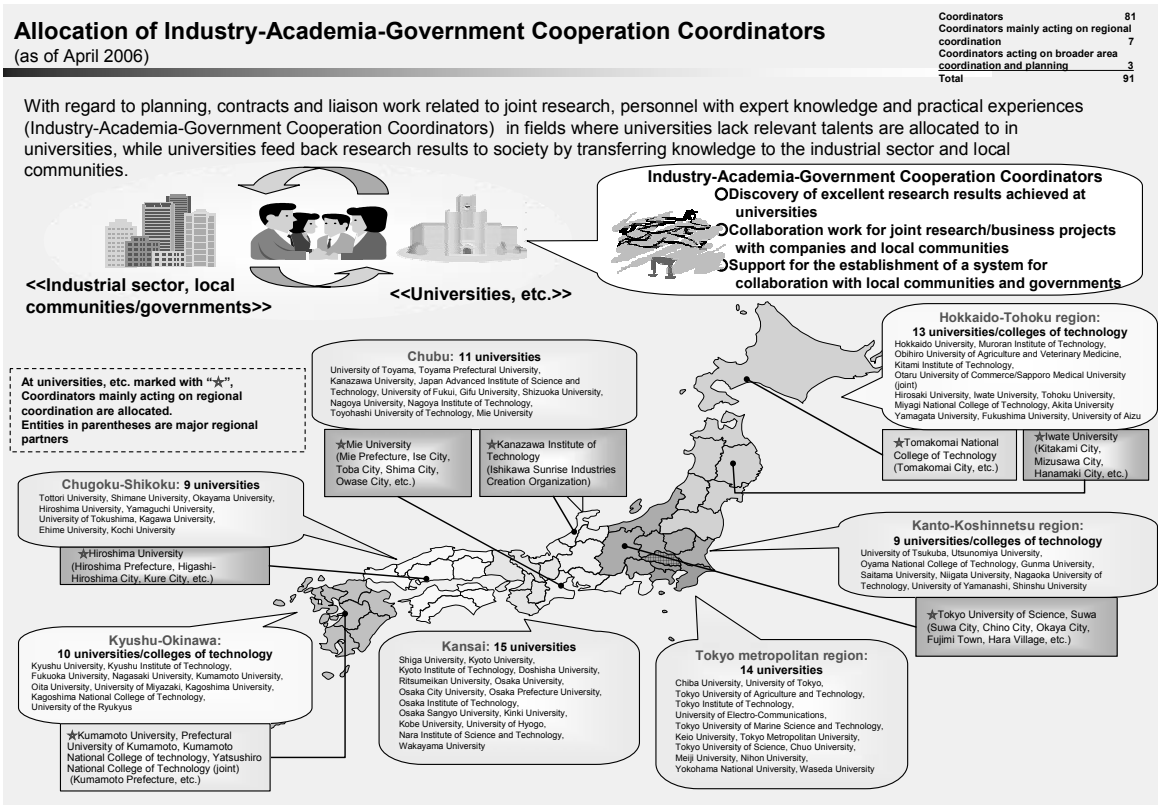


Figure 3-3-8 Allocation of Industry-Academia-Government Cooperation Coordinators (as of April 2006)

private-sector companies and universities so as to promote industry-academia-government collaboration in regions and exchanges of information. In regions where there are permanent coordinating organizations comprising private-sector companies, universities, etc., a variety of activities are being promoted, including efforts to facilitate the matching of technology seeds and user needs through lectures, seminars, exhibitions, etc., to secure competitive funds through the enhancement of the collaboration of joint research programs implemented by the industrial, academic and government sectors.

The National Institute of Advanced Industrial Science and Technology (AIST) has established a new post called "innovation architect," for persons who should be familiar with both research results and user needs, thus enhancing the function for connecting the provider of scientific knowledge with the user. As an example of projects led by innovation architects, AIST is implementing the AIST Industrial Innovation Research Initiative, in which companies, universities and AIST share clear visions for leading technology seeds to the creation of new industries and aim for prototype development by pooling their technologies, funds and human resources.

Meanwhile, competitive funding programs are supporting joint R&D projects implemented by the industrial, academic and government sectors, in various stages of development, from basic research to applications/commercialization and for various purposes. Comprehensive projects supported by the competitive funding programs of specific government ministries and agencies include: the development of advanced technologies through industry-academia-government collaboration supported by the Ministry of Internal Affairs and Communications' Program for Promoting Strategic Information and Communications Research and Development, the Collaborative Development of Innovative Seeds supported by the Japan Science and Technology Agency, the Research for the utilization and industrialization of agricultural biotechnology supported by the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Economy, Trade and Industry's R&D Project for Creation and Commercialization of University-Based Businesses and the Ministry of Environment's Environmental Technology Development Fund.

(Sustainable development of industry-academia-government collaboration)

- Fostering trust among industry, academia and government -

To promote the strengthening of collaboration among industry, academia, and government, it is essential to bring about a state of common recognition between industry and public research institutions, including universities. To this end, the government provides opportunities for dialogue between companies and universities, while research institutions, including universities, announce research results and disclose other information by holding conferences, issuing periodical publications such as annual reports, contributing papers to academic journals and disclosing patents.

Furthermore, 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 2006-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. (For the Conference on the Promotion of Collaboration between Industry, Academia and Government and the Business-Academia-Government Collaboration Summit, see 3.3.2.3(2))

- Promotion of voluntary initiatives by universities, etc. -

In promoting collaboration between industry, academia and government, it is extremely important to appropriately deal with any "conflict of interest[23]" that may arise in universities and research institutions on a daily basis.

With regard to clinical research and clinical trials in particular, more prudence is required. Therefore, MEXT in March 2006 published the "Guideline on the Formulation of Policies concerning Conflicts of Interest in Clinical Research," which was drawn up on commission from MEXT by the University of Tokushima,

[23] Conflict of interest: A situation in which profits gained by teachers and universities from activities related to industry-academia-government collaboration (implementation revenue, business rewards, privately-held shares, etc.) or their duties owed to companies in such activities are in conflict with their duties related to education and research activities at universities.

so as to promote the formulation of relevant policies at universities.

Moreover, the National University Corporation Act (Act No. 112 of 2003) allows investments in TLOs (technology licensing organizations) as a way to facilitate a virtuous circle of knowledge creation and promote feedback of research results to society. For example, Niigata University invested in an authorized TLO (Niigata Technology Licensing Organization) after obtaining the approval of the Minister of Education, Culture, Sports, Science and Technology in March 2006.

- Revitalization of university intellectual property centers and technology licensing organizations (TLOs) and enhancement of collaboration -

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.

In addition, based on the Law for Promoting University-Industry Technology Transfer (Law No. 52 of 1998), 42 TLOs (Table 3-3-9) were approved at the end of March 2007. The number of secured patents licenses was 2,632 as of the end of March 2006.

Table 3-3-9 Approved TLOs

March 2007: 42 institutions approved as TLOs

	Name of TLO company	Corporate status	Date approved	Name of participating university
External-type (9)	Institute of Tsukuba Liaison Co., Ltd.	Corporation	Apr. 16, 1999	University of Tsukuba
	Toudai TLO (CASTI)	Corporation	Dec. 4, 1998	University of Tokyo
	The Foundation for the Promotion of Industrial Science	Foundation	Aug. 30, 2001	Institute of Industrial Sciences, University of Tokyo
	Tokyo University of Agriculture and Technology TLO, Co. Ltd.	Corporation	Dec. 10, 2001	Tokyo University of Agriculture and Technology
	The Circle for the Promotion of Science and Engineering	Foundation	Aug. 26, 1999	Tokyo Institute of Technology
	Campus Create. Co., Ltd.	Corporation	Feb. 19, 2003	The University of Electro-Communications
	Toyohashi Campus Innovation Inc.	Corporation	Sep. 5, 2005	Toyohashi University of Technology
	Yamaguchi Technology Licensing Organization Co., Ltd.	Limited company	Dec. 9, 1999	Yamaguchi University
	Kyushu TLO Company, Ltd.	Corporation	Apr. 19, 2000	Kyushu University
Regional-type (24)	Hokkaido Technology Licensing Office Co., Ltd.	Corporation	Dec. 24, 1999	Hokkaido University and other universities and colleges in Hokkaido
	Tohoku Techno Arch Co., Ltd.	Corporation	Dec.4, 1998	Tohoku University, other national universities, etc., in the Tohoku region
	Technology Advanced Metropolitan Area Technology Licensing Organization	Corporation	Dec. 4, 2000	Tokyo metropolitan area universities
	Yokohama TLO Co., Ltd.	Corporation	Apr. 25, 2001	Yokohama National University, Yokohama City University, and other universities and colleges in Kanagawa prefecture
	Niigata Technology Licensing Organization Co., Ltd.	Corporation	Dec. 25, 2001	Niigata University and other universities and colleges in Niigata prefecture
	Omni Institute Corporation	Corporation	Feb. 24, 2005	Nagaoka University of Technology, Nagaoka National College of Technology, University of Hyogo
	KUTLO (Kanazawa University Technology Licensing Organization)	Limited company	Dec. 26, 2002	Kanazawa University and other universities and colleges in Ishikawa prefecture and the Hokuriku region
	Yamanashi Technology Licensing Organization Co., Ltd.	Corporation	Sep. 21, 2000	Yamanashi University and other universities and colleges in Yamanashi prefecture

	Name of TLO company	Corporate status	Date approved	Name of participating university
	SHINSHU Technology Licensing Organization	Corporation	Apr. 18, 2003	Shinshu University, Nagano National College of Technology
	Hamamatsu Foundation for Science and Technology PROMOTION	Foundation	Jan. 17, 2002	Shizuoka University and other universities and colleges in Shizuoka prefecture
	Nagoya Industrial Science Research institute (Chubu TLO)	Foundation	Apr. 19, 2000	Nagoya University and other universities and colleges in the Chubu region
	Mie TLO (Mie Technology Llicensing Organization)	Corporation	Apr. 16, 2002	Mie University and other universities and colleges in Mie prefecture
	Kansai Technology Licensing Organization Co., Ltd.	Corporation	Dec. 4, 1998	Universities and colleges in the Kansai region (Kyoto University, Ritsumeikan University, etc.)
Regional-type (24)	Osaka Industrial Promotion Organization	Foundation	Aug. 30, 2001	Osaka University and other universities and colleges in Osaka prefecture
	New Industry Research Organization (TLO Hyogo)	Foundation	Apr. 19, 2000	Kobe University and other universities and colleges in Hyogo prefecture
	Okayama Prefecture Industrial Promotion Foundation	Foundation	Apr. 28, 2004	Okayama University and other universities and colleges in Okayama prefecture
	Hiroshima Industrial Promotion Organization	Foundation	Oct. 09, 2003	Hiroshima University and other universities and colleges in Hiroshima prefecture
	Techno Network Shikoku Co., LTD.	Corporation	Apr. 25, 2001	Universities in the Shikoku region
	Kitakyushu Technology Center Co., LTD.	Foundation	Apr. 1, 2002	Kyushu Institute of Technology and other universities and colleges in the Northern Kyushu region
	Nagasaki Technology Licensing Organization	Corporation	Oct. 15, 2004	Nagasaki University and other universities and colleges in Nagasaki prefecture
	Kumamoto Technology and Industry Foundation	Foundation	Aug. 30, 2001	Kumamoto University and other universities and colleges in Kumamoto prefecture
	Oita Technology Licensing Organization, Ltd.	Limited company	Aug. 26, 2003	Oita University and other universities and colleges in Oita prefecture
	Miyazaki TLO	Corporation	Mar. 16, 2003	University of Miyazaki and other universities and colleges in Miyazaki prefecture
	Kagoshima Technology Licensing Organization Co., Ltd.	Corporation	Feb. 19, 2003	Kagoshima University and other universities and colleges in Kagoshima prefecture
Internal-type (9)	Keio University Intellectual Property Center	School corporation	Aug. 26, 1999	Organizations on the Keio University campus
	Tokyo Denki University Center for Research Collaboration	School corporation	Jun. 14, 2000	Organizations on the Tokyo Denki University campus
	RIDAI-SCITEC	School corporation	Sep. 30, 2003	Organizations on the Tokyo University of Science campus
	Nihon University Business, Research and Intellectual Property Center (NUBIC)	School corporation	Dec. 4, 1998	Organizations on the Nihon University campus
	NMS-TLO Center	School corporation	Feb. 19, 2003	Organizations on the Nippon Medical School campus
	Meiji University Intellectual Property Center	School corporation	Apr. 25, 2001	Organizations on the Meiji University campus
	Waseda University Intellectual Property Center	School corporation	Apr. 16, 1999	Organizations on the Waseda University campus
	Saga University TLO	National university corporation	Jul. 7, 2005	Organizations on the Saga University campus
	Organization for Academic-Industrial Collaboration and Intellectual Property, Chiba University	National university corporation	Jul. 7, 2006	Organizations on the Chiba University campus

- Smooth implementation of intellectual property-related activities -

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, 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 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. 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. Furthermore, in collaboration with universities, public research institutions, and TLOs, the JST provides development referrals for, and help with, licensing research results.

(3) Promotion of foundation of R&D-oriented ventures

Thanks to efforts by the industrial, academic and government sectors with regard to university-based venture companies, more than 1,300 such venture companies have so far been established nationwide. The Japan Science and Technology Agency (JST) has been implementing the Pre-Venture Project since fiscal 1999 and the Creation and Support Program for Start-ups from Universities since fiscal 2003 as part of its effort to support research related to the creation of university-based start-ups, with 57 new such start-ups established by the end of January 2007. 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, with a view to promoting the creation of new industries and foundation of start-up companies, provides support to R&D projects by researchers at private-sector companies, universities, etc. that aim to found biotechnology venture companies by taking advantage of their unique ideas and research seeds.

(4) Promotion of R&D by private-sector companies

It is private-sector companies that create market value from the results of R&D and industry-academia-government collaboration in the form of new products and achieve ultimate realization of innovations. Therefore, it is important to revitalize R&D activities of private-sector companies. The government, while respecting the principle of self-support efforts by the private sector, stimulates the motivation of private-sector companies by utilizing tax measures that facilitate R&D and enhancing

Table 3-3-10 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 special research and development expenditures (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 Act, Article 10 (income tax), Article 42-4, Article 68-9 (corporation tax), Local Tax Act, Supplementary Provision, Article 8, Item 1.	Enacted in FY2003

Item	Purpose	Description	Applicable law	Date of enactment/ validity
		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)

technology development support programs that reduce the risks involved in the R&D process that leads up to commercialization.

(Promotion of private-sector R&D activities through tax measures)

To promote research and development by the private sector, various tax measures are provided as shown in the table below. In addition to the tax credit for experiment and research expenses, which deducts a certain percentage of gross experimental and research expenses from taxable income, an additional deduction is applied in proportion to the amount of increase in such expenses as a two-year special measure to be in place until fiscal 2007 (Table 3-3-10).

(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.

- Development Bank of Japan

The Development Bank of Japan is implementing the New Technology Research and Development Loan Program to provide long-term, low-interest loans to finance development costs related to new technologies in fields designated as policy priorities by the Third Science and Technology Basic Plan, in order to enhance the international competitiveness of Japanese industry through the foundation of start-up companies based on new technologies.

(Promotion of private-sector R&D activities through subsidies)

1) Subsidies for commercialization of industrial technologies

Subsidies are provided through the New Energy and Industrial Technology Development Organization to support development projects intended to bring useful technology seeds owned by private-sector companies to commercialization in fields designated as policy priorities by the Third Science and Technology Basic Plan, with due consideration for the status of utilization of other management resources. The provision of the subsidies is conducted after information concerning the status of the fund recipient companies' management of intellectual properties is obtained from the companies' managers so as to ensure their management (intellectual property management) makes the maximum use of the research results.

2) Support program for private-sector infrastructure technology research

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, and entrusted research projects are ongoing. Applications concerning electro-communications and broadcasting technologies are accepted through the National Institute of Information and Communications Technology, and those concerning mining and manufacturing technologies

are accepted through the New Energy and Industrial Technology Development Organization.

(Program for new technology development to activate agriculture, forestry, fisheries and food industry by cooperating industry, academia and the government)

The development of new technologies through private-sector companies and universities and public organizations such as incorporated administrative agencies is promoted in order to help to create new industries and businesses in the agriculture, forestry, fisheries and food sectors and resolve various problems and policy issues faced by the food industry, etc.

(Project for promotion of private-sector commercialization research)

Entrusted R&D programs in the commercialization stage are implemented in the private sector in order to facilitate the development of revolutionary bio-oriented technologies that help to enhance the agriculture, forestry, fisheries, beverage/food and brewing industries.

(SBIR program)

The SBIR program is intended to provide consistent support to R&D activities of small- and medium-size enterprises and commercialization of their research results through inter-ministerial collaboration. Under this program, efforts are underway to increase opportunities for providing subsidies and paying entrustment fees related to R&D for new technologies that enable small- and medium-size enterprises to engage in new business operations. In addition, patent fees are reduced and the quotas for loan guarantees are expanded. In fiscal 2006, seven ministries (Ministry of Internal Affairs and Communications, MEXT, Ministry of Health, Labour and Welfare, Ministry of Agriculture, Forestry and Fisheries, Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure and Transport and Ministry of Environment) designated a total of 64 cases as eligible for special subsidies, and set the goal of providing about 37 billion yen to small- and medium-size enterprises.

3.3.2.4 Building Regional Innovation Systems and Creating Regions Full of Vitality

Regional promotion of science and technology helps to revitalize local industries and enhance local people's quality of life, which in turn contributes to the advancement and diversification of science and technology in Japan as a whole and the enhancement of the competitiveness of the country's systems for innovation.

Regional promotion of science and technology was designated as a priority matter by the First Science and Technology Basic Plan, and it was required that industry-academia-government collaboration be promoted in regions in accordance with the "Basic Guideline on Revitalization of Regional Science and Technology Activities," which was decided by the Prime Minister in December 1995.

As regional promotion of science and technology is becoming increasingly important as described above, prefectural governments have established councils in charge of deliberating science and technology policies and are making active contributions to the promotion of science and technology by formulating their own plans and guidelines related to science and technology (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
Gunma	Gunma Science and Technology Promotion Headquarter	September 1999
Saitama	Saitama Science and Technology Council	January 1995
Chiba	Chiba Science Council	November 1994

Prefecture/ designated city	Name of science and technology council	Established
Kanagawa	Kanagawa Science and Technology Council	June 1998
Niigata	Niigata Science and Technology Council	April 1998
Toyama	Toyama Science and Technology Council	November 1983
Ishikawa	Ishikawa Industrial Science and Technology Council →Ishikawa Industrial Innovation Council	December 1997→ 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 →Science and Technology Exchange Council	April 2001→ June 2005
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 through December 2002
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
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 Academy	January 2004
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
Oita	Oita Science and Technology Promotion Committee	June 2002 through March 2003
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→Okinawa Science and Technology Council (tentative name)	January 1995→March 2007 (planned)
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 →Kyoto City Committee on Promotion of Industrial Science and Technology	August 2005→ Scheduled to be established during FY2007
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	First Saitama Technology Policy for the 21st Century →Second Saitama Technology Policy for the 21st Century	February 1998 →Revised March 2007
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 →January 1997 →March 2002 →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

Prefecture/ designated city	Science and technology promotion policy	Date of enactment
Ishikawa	Guidelines for Promoting Industry, Science and Technology in Ishikawa Prefecture →Ishikawa Innovating Industry Strategies	February 1999 →March 2005
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	Basic Strategies for Science and Technology in Gifu Prefecture	April 2000
Gifu	Basic Strategies for Science and Technology in Gifu Prefecture →Plan for Promoting Science and Technology in Gifu Prefecture	March 1997 →Revised March 2002 →Revised March 2007
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 through March 2006
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 →October 2006
Osaka City	Plan for Promoting Industrial Science and Technology in Osaka City	March 2000
Hiroshima City	Hiroshima City Science and Technology Policy	June 2003
Kitakyushu City	Brief Guidelines for Promotion of Science and Technology in Kitakyushu City	August 2003
Fukuoka City	Vision for Promoting Science and Technology in Fukuoka City	June 2002

The Second Science and Technology Basic Plan stipulated that in order to effectively and efficiently realize the establishment of knowledge clusters under regional initiatives, the government should promote R&D activities programs including joint research programs, and endeavor to enhance the functions for developing and retaining human resources and transferring technologies. The "knowledge cluster" refers to a technology innovation system operated under a regional initiative that has as its core a public research organization adopting unique research themes for the region and that also comprises companies from within and outside the region. To be more specific, this system, by forming a human network and establishing a joint research system, causes innovative technology seeds owned by the core research organization and users' needs for commercialization to interact with each other and creates a chain of technology innovations, which would lead to the creation of new industries.

The Third Science and Technology Basic Plan calls for competition-based support for activities related to the formation of clusters under regional initiatives so as to establish regional systems for innovation and build communities full of vitality. The plan also calls for efforts to overcome the wall of segregation among ministries and agencies and increase inter-ministerial collaboration in

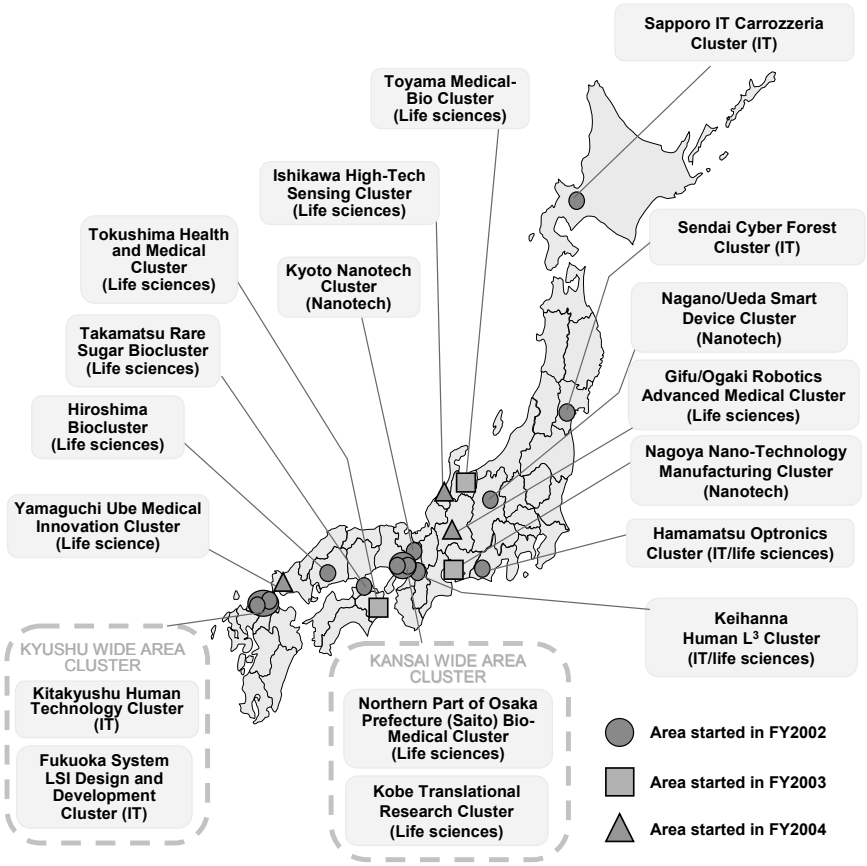


Figure 3-3-13 Map of Knowledge Clusters

order to ensure smooth implementation of science and technology-relate measures in regions.

Described below is an overview mainly of measures promoted by the government to support regional promotion of science and technology.

(1) Formation of regional clusters (Efforts toward formation of knowledge clusters)

1) Efforts toward formation of world-class clusters

Since fiscal 2002, MEXT has been implementing the "Knowledge Cluster Initiative," with related projects conducted in 18 regions across Japan in fiscal 2006. Specifically, in these projects, science and technology coordinators with expert knowledge are allocated to the "knowledge cluster headquarters" set up at the regions' core research organizations, which serve as the command offices. The command offices oversee the implementation of activities such as industry-academia joint research conducted at universities' joint research centers, etc. for the purpose of creating new technologies based on corporate needs, patent acquisitions for research achievements, fostering of personnel and publications of research results (Figure 3-3-13).

In addition, MEXT enhanced collaboration between the Knowledge Cluster Initiative and the Ministry of Economy, Trade and Industry's Industrial Cluster Program and provided support for the development of science and technology-related human resources in regions. It also conducted an interim review on projects that started in fiscal 2004 and revised the project plans and allocated funds based on the results of the interim review.

Of the 18 regional projects implemented under the Knowledge Cluster Initiative, 11 were to be terminated at the end of fiscal 2006. However, the "Knowledge Cluster Initiative (2nd Stage)" is to be launched in fiscal 2007 in light of the results of the original Knowledge Cluster Initiative, in order to strenuously promote the formation of world-class clusters from the viewpoint of "selection and concentration" while encouraging regional autonomy.

2) Efforts toward formation of clusters featuring local characteristics

Since fiscal 2002, MEXT has been implementing, from the viewpoint of taking advantage of the individuality of urban areas of each prefecture and ordinance-designated cities, the "Cooperation for Innovative Technology and Advanced Research in Evolutional Area (CITY AREA)" program, which aims to create new enterprises and foster R&D-oriented regional industries by producing new technology seeds with the use of the "wisdom" of universities.

This program has two stages, a "basic stage" and a "development stage." The development stage (results-oriented type) is implemented in regions where the implementation of the general type has been completed with outstanding results. This program was implemented in a total of 59 regions by fiscal 2006.

(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 17 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 9,100 small and medium-size companies with ambitions to enter world markets, and about 290 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

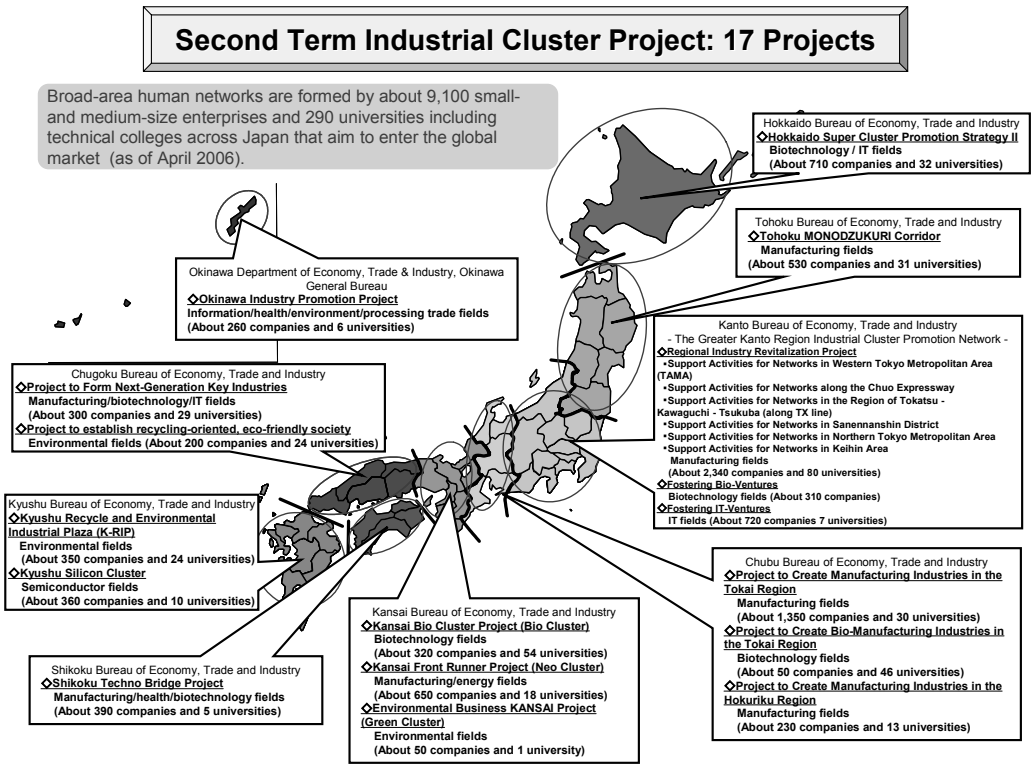


Figure 3-3-14 The Industrial Cluster Project: 17 Projects

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 30 billion yen from the FY2006 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 for-ward 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 net-works in certain regions and sectors, and the deployment of cluster managers who comprehensively coordinate each cluster's activities.

(2) Smooth development of regional measures for science and technology

(Collaboration 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.

In order to regenerate regional economies and revitalize Japan's economy, the two ministries are cooperating to enhance industry-academia collaboration in regions, provide new technology seeds and feed back information concerning market needs to R&D activities. Specifically, they are jointly holding regional meetings of the "Committee for Regional Cluster Promotions," in which officials from the two ministries share and exchange information, as well as conferences to exhibit the results of their programs. Moreover, the two ministries jointly held an "Advanced Locally Developed Technology Fair," in which the results of the programs implemented by them nationwide were exhibited, as they did in fiscal 2005, and they also jointly sponsored discussion forums on cluster policies such as the "Nationwide Knowledge and Industrial Clusters Forum" and the "Regional Clusters Seminar."

In addition, close collaboration among ministries and agencies concerned is being promoted through the "Collaboration 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.

(Various measures for regional promotion of science and technology)

Government ministries and agencies are implementing various measures for regional promotion of science and technology (Table 3-3-15). Major such measures are as follows:

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	Research and Development Promoting Info-Communications Technology for Community Development	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.
	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. (New adoption was terminated in FY2005. New projects adopted in FY2005 are scheduled to be shifted to the "Collaboration of Regional Entities for the Advancement of Technological Excellence" in the "Comprehensive Support Programs for Creation of Regional Innovation")
	Comprehensive Support Programs for Creation of Regional Innovation (Japan Science and Technology Agency)	As a hub for Innovation Plazas and JST Satellite in Japan, the collaboration between basic research and technology transfer projects in local governments, Bureaus of Economy, Trade and Industry, and JST is promoted to support creation of regional innovation comprehensively by continuous implementation of R&D from investigation of seeds to practical application. This program includes the "Science and Technology Incubation Program in Advanced Regions," "Regional Research and Development Resources Utilization Program," and "Collaboration of Regional Entities for the Advancement of Technological Excellence," which aim to create regional innovation in such organic collaboration.
Ministry of Agriculture, Forestry and Fisheries, Agriculture, Forestry and Fisheries Research Council Secretariat	Research project for utilizing advanced technologies in agriculture, forestry and fisheries	Promotes R&D in agriculture, forestry and fisheries closely related to site of production and other relevant distribution/process, etc. by proposals.
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 or Agency, related organizations	Item	Outline of measures
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) Ministry of Internal Affairs and Communications

"Research and Development Promoting Info-Communications Technology for Community Development" in the Strategic Information and Communications R&D Promotion Programme 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.

2) MEXT

MEXT provides support for the creation of innovations in regions through the Comprehensive Support Program for Creation of Regional Innovation of the Japan Science and Technology Agency (JST), by using JST Innovation Plazas (eight locations nationwide) and JST satellites (eight locations nationwide) as footholds for ensuring a consistent flow of R&D activities from the discovery of seeds to commercialization while maintaining collaboration among local governments, regional bureaus of economy, trade and industry and people involved in basic research and technology transfer projects conducted by JST's basic research and technology transfer projects.

3) Ministry of Agriculture, Forestry and Fisheries

Under 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, a new research type was established in fiscal 2006 in order to promote regional R&D activities through industry-academia collaboration. In the new type, relevant organizations such as universities and research institutions in the industrial, academic and government sectors form a network under the coordinating organization so as to accelerate the dissemination and commercialization of research results. Moreover, in order to promote advanced technologies related to the agriculture, forestry, and fisheries sector and support the development and revitalization of the agriculture, forestry, fisheries and food industries, regional biotechnology consultation forums are held. In these forums, in which private-sector companies, universities, etc. participate, efforts are made to promote industry-academia-government collaboration and exchanges of information in regions through activities such as matching of technology seeds and user needs through lectures, seminars and exhibitions and acquisitions of competitive funds through the implementation and enhancement of efforts to coordinate industry-academia-government joint research programs.

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.

The National Institute of Advanced Industrial Science and Technology (AIST) invited researchers who understand the needs of regional small-and medium-size corporations from public experiment and research organizations (14 researchers were invited in fiscal 2006) and cooperated with engineers of such corporations when necessary to resolve technical problems faced by them in joint research programs and develop products based on

technologies owned by AIST.

5) Ministry of Land, Infrastructure and Transport

In order to facilitate collaboration 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 Kyoto in February 2007, with 464 representatives of local industry, academia, and governments, as well as representatives of the Ministry and relevant research institutions attending. Under the "Construction Technology Research and Development Subsidy Program," which is a competitive funding program, proposals for commercialization-stage R&D research themes that meet local needs are publicly invited, with subsidies provided to excellent proposals that utilize industry-academia-government collaboration.

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.

In order to develop and disseminate advanced environmental technologies and promote regional environmental businesses by placing increased emphasis on R&D activities at the regional level, the Ministry sets quotas for research themes featuring local individuality and characteristics in all technology fields covered by the commercialization R&D program sponsored by the Environmental Technology Development Promotion Funds program.

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

The relevant government ministries are implementing various measures directed at public experimental research institutions. These measures are summarized in Table 3-3-16.

(Interregional Collaboration and Exchanges)

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

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

The Japan Association for the Advancement of

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 allocation measures for the research and development activity expenses of prefectural industrial technology centers, sanitation research institutes, agricultural test sites, livestock test sites, fishery test sites, and other public testing and research institutions.
Ministry of Agriculture, Forestry and Fisheries	Promotes research projects consigned to prefectural institutions, and implemented as part of national research ・Breeding programs for major crops ・Compliant researches and developments 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.

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.

2) 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 collaboration, research exchanges, and information exchanges among public research institutions as well as between public and national experimental research institutions.

(Consolidation of R&D Bases)

The current national comprehensive development plan, known as the "National Grand Design for the 21st Century," places priority on networking and R&D investments directed at organizations representing industry, academia, and the government. The plan promotes the development of the Tsukuba Science City and the Kansai Science City, and sets forth the development of new research and development bases of an international standard that will serve as the nucleus for the establishment of far-reaching international exchange parks.

1) Tsukuba Science City

Tsukuba Science City was created as a base to provide research and education of a high standard, and to contribute to the balanced development of the entire Tokyo metropolitan area. It was constructed also as part of a national government policy, in order to promote science and technology and enrich higher education. Thirty-one such as national experimental research and education institutions and so on are located in the city, and many private-sector research institutions are also moving in.

Various measures are currently being promoted to develop urban environments, to encourage science and technology, and to form bases for the creation of new industries both in Japan and abroad.

2) Kansai Science City

The Kansai Science City is a part of Kyoto, Osaka, and Nara prefectures, and seeks to establish a base for new advancements in culture, science, and research of a creative and international nature that will extend across the 21st century.

The city is experiencing steady development in construction in accordance with the Kansai Science City Construction Promotion Law enacted in June 1987. At the end of FY2006, a total of about 250 facilities, including private sector research facilities, were established and operating within the city.

3.3.2.5 Effective and Efficient Implementation of R&D

(1) Effective use of research funds

In order to promote appropriate and efficient use of research funds, the Council for Science and Technology Policy in August 2006 approved "Regarding Prevention of Illegal Use of Public Research Funds (common guideline)" and submitted it to the ministers concerned. In this guideline, the council, with a view to preventing illegal use of research funds by researchers, called for early actions by ministries and agencies concerned, fund allocating organizations and research organizations to enhance and clarify rules and strengthen the management and auditing of research funds.

In addition, in order to eliminate unreasonable overlapping allocation of research funds, ministries and agencies concerned are required to share information when making selections for the provision of competitive funds. Moreover, from July 2006, the use of the Cabinet Office's "Government R&D Database" started in order to check any overlap.

As well, the Cabinet Office, with the support of ministries and agencies concerned, continued to collect data for the "Government R&D Database," which is utilized for macro analysis necessary for the formulation of Science and Technology Basic Plans and research and deliberations concerning fund allocations.

(Elimination of waste in fund allocations)

Unreasonable overlapping allocations of funds and excessive concentration of funds over one's effort must be eliminated. As a countermeasure, monitoring overlaps are conducted with the use of the "Government R&D Database." In addition, a "Cross-ministerial R&D management system," which will promote electronic applications for competitive funds and enable efficient monitoring of overlap of fund allocations is underway.

Ministries and agencies introduce strict countermeasures against misuse of research funding such as suspension from research funds for those researchers who misused. As explained above, the Council for Science and Technology Policy called for ministries and agencies concerned, fund allocating organizations and research organizations to enhance and clarify rules and establishment in "Regarding Prevention of Illegal Use of Public Research Funds (common guideline)." MEXT, based on the view that stronger management and supervision of research funds are essential for preventing misuse of funds, on February 15, 2007 adopted the "Guideline for Managing and Auditing Public Research Funds at Research Institutions" upon approval from the Minister of Education, Culture, Sports, Science and Technology on the basis of the report of a committee of outside experts for the countermeasures against misuse of research funding. From this point forward, MEXT intends to endeavor to prevent misuse of public research funds by confirming how the management and auditing of funds are being enhanced in accordance with the aforesaid guideline and by giving improvement instructions and demanding corrective actions as necessary.

(2) Emphasis on development and utilization of human resources

Given that it is important to develop human resources through R&D activities, and that increased emphasis on R&D should be accompanied by increased emphasis on human resources, it is necessary to attach more importance to the development and utilization of human resources in the allocation of competitive research funds.

As a way to support young researchers, MEXT's Grants-in-Aid for Scientific Research program endeavors to expand research funds for young researchers with the new "Start-Up" program for young researchers launched in fiscal 2006. Measures continued from the previous year to support young researchers include the Ministry of Internal Affairs and Communications' Strategic Information and Communications R&D Promotion Programme, the Ministry of Health, Labour and Welfare's Health and Labour Sciences Research Grant, the Ministry of Agriculture, Forestry and Fisheries' "Program for promotion of basic research for creation of new technologies and new sectors," the Ministry of Economy, Trade and Industry's subsidy program for industrial technology research, the Ministry of Environment's Environmental Technology Promotion Fund program.

(3) Reform of 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.

All ministries and agencies conduct evaluation based on their own detailed guidelines specifying evaluation methodologies that have been formulated in accordance with the "National Guidelines on the Method of Evaluation for Government R&D" (decided by the Prime Minister on March 29, 2005). MEXT, which accounts for more than 60 pct of the government's total science and technology-related expenses, has established the "Guideline for Evaluation of Research and Development in MEXT" (decided by the Minister of Education, Culture, Sports, Science and Technology on September 26, 2005). To cite an example of evaluation based on this guideline, MEXT conducts ante evaluation of key items of its budget requests by utilizing external evaluation and uses them as the criteria for judging the appropriateness of its budget requests. Interim and ex post evaluation are also conducted appropriately.

Meanwhile, incorporated administrative agencies and national universities conduct evaluation of their performance in accordance with the General Rules of Incorporated Administrative Agencies, the Act on the General Rules of Incorporated Administrative Agencies and the National University Corporation Act, respectively. Ministries and agencies conduct policy evaluation in accordance with the Act for Evaluations of Policies Performed by Administrative Institutions.

3.3.2.6 Removal of Institutional and Operational Bottlenecks that Hinder Smooth Science and Technology-Related Activities and Feedback of Results

When promoting science and technology, active exchanges of personnel, smooth implementation of research activities and the enhancement of the institutional environment that facilitate feedback of research results to society are the keys to increasing the effects of the investment of human and physical resources in science and technology. Therefore, the Council for Science and Technology Policy has recommended a total of 66 items of reform regarding the following seven matters in order to resolve various issues that have emerged at the actual sites of research activities as institutional problems that hamper the promotion of science and technology and the feedback of research results. The agency drew up a work schedule that specifies the ministries and agencies concerned, the implementation schedule for deliberations and deadlines for reaching conclusions, and submitted it to the relevant ministers on December 25, 2006.

1. Realization of systems that attract excellent foreign researchers to Japan

   In order to achieve the creation of innovations, which is an urgent task for Japan, it is necessary to attract excellent foreign researchers to the country and enable them to exercise their capabilities. To this end, Japan should reform the immigration control system.

   (Institutional reform items)
   * Further extension of the allowable duration of stay for degree holders to find jobs
   * Simplification of procedures concerning researchers' residence qualifications
2. Cultivation of an environment that increases the mobility of researchers

   In order to revitalize the research environment in Japan, it is important to enable researchers to easily move between various research organizations in and outside Japan, and measures for increasing such mobility should be implemented.

   (Institutional reform items)
   * Proposal for the establishment of a new pension system that would not bring any disadvantage to researchers who move around
   * Widespread introduction of a system of allowing advance payment of retirement allowances, etc.
3. Realization of appropriate and efficient use of research funds

   Institutional reforms regarding research funding programs should be carried out so as to cultivate a better environment for the use of funds at the actual sites of research activities and make effective use of the limited national budgets.

   (Institutional reform items)
   * Promotion of utilization of the fund carryover system and full communication thereof
   * Speedier disbursement of research funds
4. Enhancement of support for research

   In order to promote creative R&D activities, it is necessary to enhance the research support mechanism and enable researchers to devote themselves to research activities, and institutional reforms for this purpose should be carried out.

   (Institutional reform items)
   * Unified management of researchers throughout the university
   * Inter-organization collaboration and utilization of private-sector vitality, etc.
5. Cultivation of an environment for enabling female researchers to play a more active role

   Institutional reforms should be carried out so as to enable female researchers to engage in research and child care simultaneously. Institutional reforms suited to the various working styles of researchers are also necessary so as to avoid putting at a career disadvantage female researchers forced to suspend their research activities due to child-bearing/child bearing.

   (Institutional reform items)
   * Easing of conditions for taking child care holidays for researchers working under a fixed-term contract
   * Expansion of special measures for working mothers such as shortened working hours (at-home work system), etc.
6. Comprehensive promotion of clinical research including clinical trials

   Institutional bottlenecks that hamper the promotion of clinical research including clinical trials should be removed so as to revitalize medical research and provide people with quick access to cutting-edge medical treatment.

   (Institutional reform items)
   * Enhancement of Pharmaceuticals and Medical Devices Agency's evaluation system
   * Formulation of implementation guidelines concerning clinical research, etc.
7. Promotion of people's understanding of science and technology

For Japan to achieve its goal of becoming an advanced science and technology-oriented nation, it is important to have people understand the substance and necessity of science and technology and foster their interest therein, and reforms for this purpose should be carried out.

(Institutional reform items)

* Systemic and organized implementation of enlightenment activities
* Implementation of enlightenment activities by universities and research organizations on a permanent basis.

3.3.3 Reinforcing the Foundation for Promoting Science and Technology

3.3.3.1 Strategic and Prioritized Improvement of Facilities and Equipment

(1) Improvement of facilities of national universities, etc.

The facilities of national universities, etc. are centers of activity for the development of world-leading human resources and the implementation of cutting-edge research and constitute an essential foundation of Japan's aim to become an advanced science and technology-oriented nation.

Under the "Five-Year Program for Emergent Renovation and Building of Facilities of National Universities, etc.," which was formulated in fiscal 2001, national universities' facilities have been improved in order to enhance the education and research environment because measures to resolve the crammed conditions have been implemented with the use of PFI (private-finance initiative) and also because public utilization spaces that can be utilized flexibly have been secured. As a result, some effects became apparent, realizing progress in education and research, helping to foster researchers with advanced technological expertise and leading to the development of new technologies. Meanwhile, as many existing facilities have been left to become obsolete, students and young researchers who should lead research activities in the future still face an insufficient education and research environment in many cases.

In light of this situation and based on the Third Science and Technology Basic Plan, MEXT in April 2006 established the "Second Five-Year Program for Emergent Renovation and Building of Facilities of National Universities, etc.," which specified the facilities that should be improved over the five-year period between fiscal 2006 and 2010 as an emergency measure, with a view to promoting the prioritized and systematic improvement of national universities' facilities (Figure 3-3-17).

This program places the refurbished of deteriorated facilities as the top priority task. This program seeks to regenerate facilities that form the foundation of the development of excellent human resources and outstanding research centers where world-class advanced research is conducted by improving deteriorated facilities and resolving the crammed conditions of facilities. The program aims to complete the improvement of facilities with total floor spaces of about 5.4 million square meters,

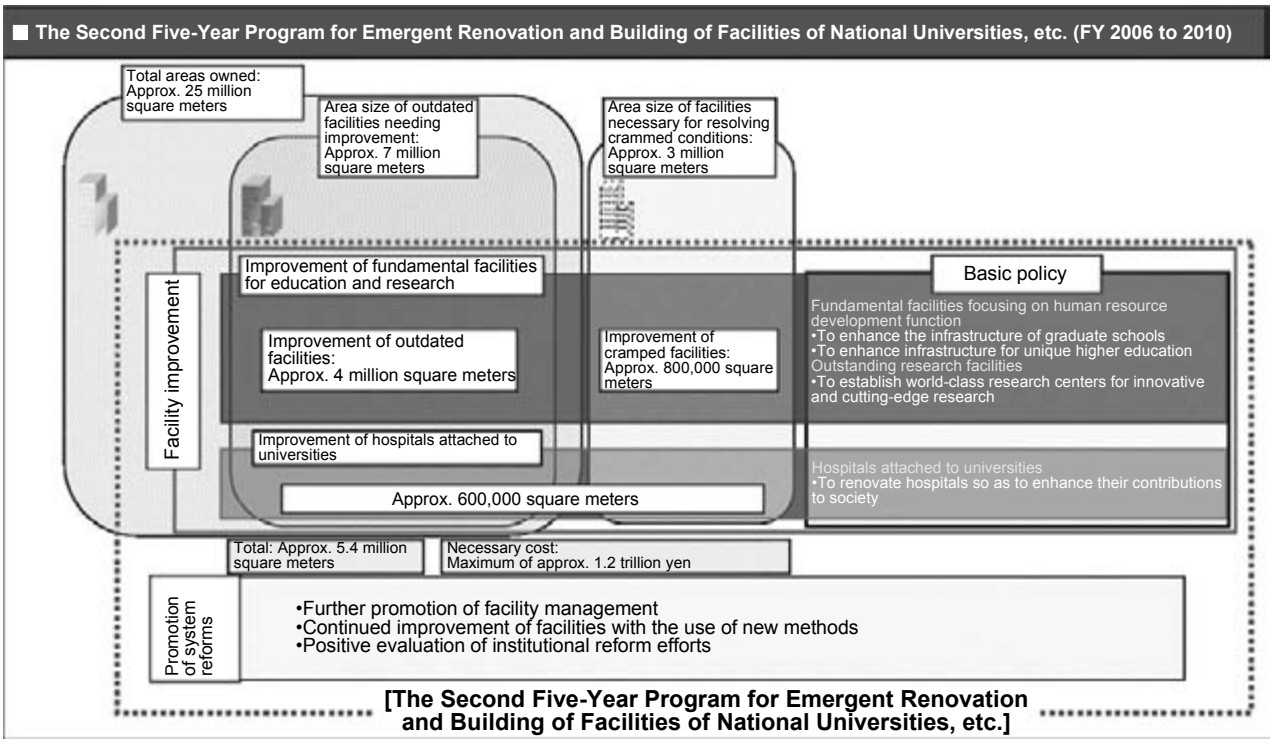


Figure 3-3-17 2nd Five-Year Program for Emergent Renovation and Building of Facilities of National Universities, etc. (FY 2006 to 2010)

out of the some 10 million square meters for which improvement work is deemed as necessary (as of the end of fiscal 2005).

In addition to improving facilities, this program calls for national universities to promote further system reforms, such as the introduction of facility management that would enable efficient and flexible use of facilities and the adoption of new schemes for facility improvement such as use of donated funds.

(2) Improvement of facilities of national universities and public research organizations

In order to promote academic research, it is essential to improve facilities that form the foundation of research activities. With regard to the improvement of research facilities, MEXT held discussions to "improve academic research facilities at national, public and private universities" at the Working Group for Academic Research Facilities, which was established under the Council for Science and Technology, and subsequently issued a report in June 2005.

In light of the report, the government is endeavoring to provide more effective support for the improvement of facilities at national universities, including facilities planned as research infrastructure from mid- to long- term viewpoints and facilities necessary for promoting unique research.

(3) Improvement of facilities and equipment of private universities

It is critical for Japan to improve the research environment, such as facilities and equipment, necessary for promoting advancement of academic research. Private universities, which account for about 80% of Japan's higher education, have been greatly contributing to the advancement of higher education by serving as a diverse source of researchers and by actively engaging in unique research activities, and expectations for their role are growing.

In light of this situation, MEXT is endeavoring to enhance the foundation of private universities' research by implementing the "Program for Promoting Advancement of Academic Research at Private Universities," which provides comprehensive support to research facilities and equipment related to excellent research projects.

(4) Promotion of improvement and public utilization of advanced large public-utilization research facilities

The development of advanced large research facilities in state-of-the-art fields contributes greatly to the progress of science and technology, as such facilities themselves represent the fruits of state-of-the-art research activities. However, the important thing is to make the most of such facilities so as to promote Japan's R&D activities as a whole and enhance the standard of science and technology in the country. It is desirable that public utilization of advanced large research facilities by researchers in the industrial, academic and government sectors in a wide range of science and technology fields will help to achieve outstanding research results.

In this context, the "Law for the Promotion of Public Utilization of the Specific Advanced Large Research Facilities" (hereinafter referred to as "Public Utilization Law," which was put into effect in July 2006 as an amendment of the "Law for the Promotion of Public Utilization of the Specific Synchrotron Radiation Facility," designates not only a specific synchrotron radiation facility but also a specific supercomputer facility as specific advanced large research facilities for public utilization. The amended law promotes public utilization of such facilities by allowing registered organizations independent of facility owners to select users and provide user support.

Based on this law, MEXT 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 fiscal 2006, the Japan Synchrotron Radiation Research Institute, as a registered organization for the promotion of public utilization of facilities under the Public Utilization Law, adopted about 1,250 research topics for public utilization of beam lines, with significant results achieved with regard to such themes as "Clarification of Drug Recognition and Exclusion Mechanism that Allows Bacteria to Develop Resistance to Drugs" and "Real-Time Analysis of Fuel Cell Catalysts (Clarification of Mechanism toward Realization of Fuel Cell Vehicles)."

In addition, in order to exercise Japan's research potential to the fullest, it is important to allow a broad range of researchers in the industrial, academic and government sectors to use not only the above-mentioned specific advanced large research facilities but also advanced research facilities owned by incorporated

administrative agencies and universities to an extent that would not disturb the operations of the owner organizations concerned.

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 partially revised to require the government (MEXT) to provide information useful for the promotion of public utilization of research facilities. Since fiscal 2005, the program of strategic utilization of advanced large research facilities has been implemented to enhance user support so as to increase the number of new users, mainly those in the industrial sector.

With regard to public utilization facilities and equipment that would be too large-scale and too costly to be built by the private sector, the government undertakes construction and provides such facilities for public utilization (Table 3-3-18).

Table 3-3-18 Development of large-scale and expensive joint-use facilities

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) (Unit: Cases) (FY)										
			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Ministry of Education, Culture, Sports, Science and Technology	1996	Numerical Space Engine Supercomputer and various servers	1	4	2	0	0	0	0	0	0	0	0
	1997	Snow and Ice Disaster Prevention Test Facility 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 Low-temperature test facility: Temperature –35℃ to 25℃ Base area: 25m × 7m	-	1	3	0	3	6	6	8	8	7	2
	1997	Synchrotron Radiation Facility (SPring-8) The facility 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, which is used by researchers in a wide range of disciplines among industry, academia, and government. The world's most advanced synchrotron radiation facility with 8GeV-accumulated electron energy and available to set up at maximum 62 beam lines	-	5	14	26	50	62	100	115	139	219	255
	1997	High Enthalpy Shock Tunnel At 80 meters in length, the world's largest free-piston shock tunnel. Maximum pressure 150Mpa, maximum entropy 25MJ/kg.	-	0	1	0	0	0	0	0	0	0	0
	1998	Ultra-Strong Magnetic Field Generating Device (powerful field 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.	16	16	62	73	70	68	83	86	85	91	91
	2005	Full size three-dimensional vibration destruction facility (E-Defense) 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.	-	-	-	-	-	-	-	-	-	0	11
Ministry of Agriculture, Forestry and Fisheries, Agriculture, Forestry	1996	Building for engineering experiments related to earthquake resistance and comfortable wood construction 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)	-	1	2	1	1	0	0	1	2	1	3
Ministry of Land, Infrastructure and Transport	1997	Large-scaled three-dimensional shaking table 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)	-	0	0	1	1	1	1	1	14	16	13
	1999	Aqua Restoration Research Center Researches the preservation of river and marshland ecologies, for the purpose of research and development that facilitates mankind's coexistence with nature.	-	-	-	5	3	0	2	1	0	0	0

3.3.3.2 Enhancement of the Intellectual Infrastructure

In order to reliably and effectively promote research, development and other related activities, it is necessary to undertake efforts such as ensuring the stable provision in quality and quantity, as well as ensuring the safety and reliability, of materials, standards, techniques, equipment, and other elements, that support fundamental activities for research and development, including experimentation, measurement, analysis, and evaluation. For this reason, it is necessary to promote organized development of an intellectual infrastructure that includes bio-resources and other research materials, various measurement standards, advanced tools for measurement, analysis, and experimentation and evaluation, and various databases. Also, the Third Science and Technology Basic Plan calls for improvements toward the attainment of the world's highest standards by 2010. In response, the Council for Science and Technology, an advisory group to the Minister of Education, Culture, Sports, Science and Technology, obtained the cooperation of the relevant ministries and agencies to adopt the "Intellectual Infrastructure Development Program," which lays out specific measures for the development of intellectual infrastructure by 2010. The proposed program was presented to the Minister in August 2001.

In Fiscal 2002 the ministry began the National Bio-resource Project with the aim of developing systems to systematically collect, preserve, and provide bio-resources deemed strategically important for the nation to maintain, including experimental plants and animals such as mice, various stem cell lines, and genetic resources, including the genetic material of various organisms.

Independent research and development on measurement, analysis, experimentation and evaluation, and on the state-of-the-art technologies and instruments for them, is not only the basis that upholds the research and development activities. Supported by the fact that the many researches and developments of these kinds themselves receive the Nobel Prize, it is an extremely important task for our country to serve as one of the world's front-runners in the fields of science and technology. However, the degree of dependence to foreign countries for advanced measurement and analysis instruments in Japan is high. In particular, the area of life science relies on foreign companies for most of the instruments for pioneering research (Figure 3-3-19). In light of this situation, since fiscal 2004, Japan has been implementing projects for the development of advanced measurement/analysis techniques and equipment, which will contribute to the promotion of world-leading technologies and equipment that meet the needs of researchers engaged in state-of-the-art research. Among such projects are the "Development of Controlling System of Four-Tip Scanning Tunneling Microscope and Multifunctional Carbon Nanotube Tips" and the "Development of X-ray Analysis System for Light Elements of Materials by Low Energy Ion Irradiation."

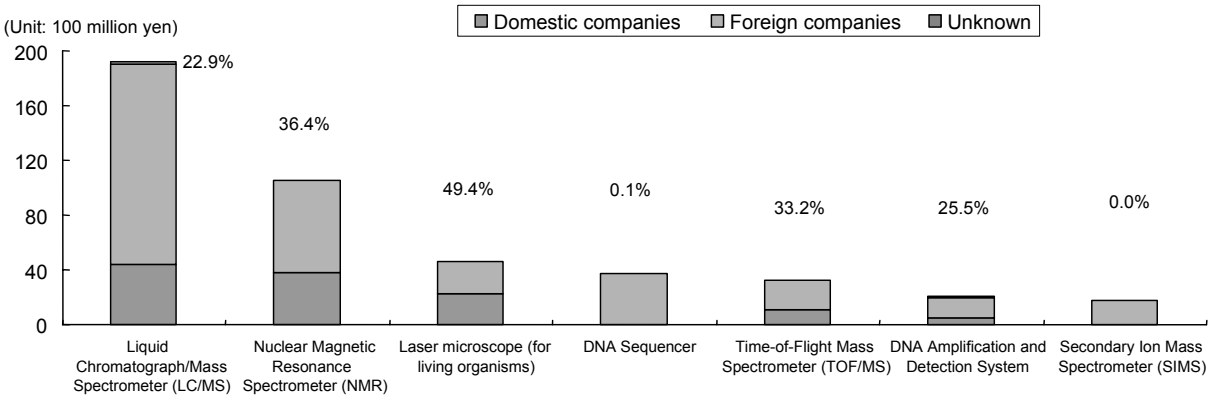


Figure 3-3-19 Shares of major measurement and analysis instruments by domestic and foreign companies (FY2005)

Notes 1. Domestic companies: shares of companies that produce and sell instruments in Japan.
Foreign companies: shares of companies that sell instruments produced abroad.
2. Figure shown with "%" in the table shows the share of domestic companies in the domestic market.
Source: Prepared by the Ministry of Education, Culture, Sports, Science and Technology, based on "Kagaku Kiki Nenkan 2006" published by R&D Corp.

The Ministry of Health, Labour and Welfare has established "master banks" at the National Institute of Biomedical Innovation (NIBIO), in order to collect and store cultured cells and genes from humans and animals that are necessary for research in the life sciences, particularly in the fields of medicine and pharmacology. The ministry furnishes these cultured cells and genes to researchers and other experts through the Japan Health Sciences Foundation (JHSF). Also, in line with the conclusions reached in "On the State of Research and Development Using Human Tissue Obtained During Operations, etc.," a report on human tissue issued by the Health Science Council's Advanced Medical Technology Evaluation Division on December 16, 1998, the Japan Health Sciences Foundation obtained the cooperation of medical institutions to collect human tissue for research use, doing so in careful consideration of bioethical issues, and commenced activities to dispense the tissue as necessary to researchers.

Elsewhere, on the issue of plants having medicinal value, as it has become difficult to secure good quality ones, the NIBIO's Research Center for Medical Plant Resources is engaged in research into technologies for the propagation (micro-propagation) of cloned plants having the same characteristics as the plants they are cloned from, and also systematically collects, preserves, and supplies medicinal plant resources. Moreover, at the Tsukuba Primate Center, the Ministry has bred crab-eating macaques, and furnished them for research use to researchers in Japan using joint facilities. Since fiscal 2006, the ministry, with a view to providing researchers at universities and private-sector companies with information related to genomes and genes of agricultural plants and animals like rice, silkworms and pigs, has been endeavoring to build up an integrated database of relevant information and establish a high-precision information search engine that utilizes links with information related to genomes of other plants and animals.

At the Ministry of Economy, Trade and Industry, the Special Committee on the Development of Intellectual Infrastructure, a joint body composed of the Industrial Structure Council Subdivision on Industrial Technology and the Japanese Industrial Standards Committee (JISC), revises the objectives for the development of intellectual infrastructure annually.

The National Metrology Institute of Japan (NMIJ), which is part of the National Institute of Advanced Industrial Science and Technology (AIST), is improving and expanding national measurement standards, and also making efforts toward international mutual recognition. In total, 252 physical standards were established and 242 references were provided by the end of fiscal 2006. In addition, the New Energy and Industrial Technology Development Organization (NEDO) conducted R&D on remote calibration as part of a plan for the period from Fiscal 2001 to Fiscal 2008.

With regard to biological resources information infrastructure, the Biological Resource Center (NBRC) of the Department of Biotechnology at the National Institute of Technology and Evaluation (NITE) in fiscal 2006 added approximately 4,300 microbial strains (now totaling approximately 40,000 strains), which it maintains and provides to the public. In addition, NITE integrated the databases of major domestic organizations that handle biological resources, took charge of operating and managing the integrated database, and made it public.

The Biotechnology Development Center, in accordance with the Convention on Biological Diversity, is cooperating with Asian countries to explore and utilize microbial resources, an example of which is the center's signing of a memorandum of understanding with Mongol on cooperation in this regard. The Patent Microorganisms Depositary expanded the range of resources it receives (animal cells and fertilized eggs). The Genome Analysis Center, with a view to promoting the utilization of biological resources, confirmed the base sequences of seven strains of microbe including Saccharomyces cerevisiae and Acetobacter, and conducted a genetic analysis on human influenza virus. At the "Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM)," which is the first framework for government-level multilateral cooperation in Asia for joint management and utilization of microbial resources, NITE has contributed to the establishment of international rules concerning the utilization of biological resources by promoting efforts to form a network of information concerning microbial strains managed by the participating countries. Meanwhile, the National Institute of Advanced Industrial Science and Technology is enhancing its database by utilizing information related to genomes and proteomes. In addition, it receives and provides microbes and animal and plant cells related to patents at the International Patent Organism Depository.

In terms of chemical safety management infrastructure, the ministry collects and coordinates data of hazardous chemical substances. The ministry also develops simplified testing methods to evaluate the chemical safety, as well as screening test methods for endocrine disruptors. In addition, the ministry carries out research and development regarding risk assessment methods of chemical substances at the New Energy and Industrial Technology Development Organization (NEDO).

For the development of infrastructure for quality life and welfare, the ministry supports the development of products designed in consideration of human characteristics, through the improvement of 3D data maintenance and the development of methods for evaluating the function and performance of welfare equipment.

The National Institute of Advanced Industrial Science and Technology, regarding geological surveys, produced 10 new kinds of geological sheet maps in fiscal 2006. It has also enhanced and updated various databases related to geological information. In fiscal 2006, for example, it introduced the WebGIS technology and made public the Integrated Geological Map Database (GeoMapDB) on a trial basis. In addition, it is involved in the development of an advanced database of materials.

The Ministry of Land, Infrastructure and Transport deals with a variety of information related to the Geographic Information System (GIS[24]); it prepares GIS framework information such as digital maps, and develops distribution environments such as provision of data over the Internet, and the expansion of clearinghouses.

The status for the development of facilities to preserve and provide intellectual infrastructure by government ministries is shown in Table 3-3-20.

Table 3-3-20 The state of development of intellectual infrastructure

Ministry or agency	Fiscal year established	Name of facility	Type of data provided or preserved
Ministry of Internal Affairs and Communications	1940	National Institute of Information and Communications Technology	Frequency standards and standard time
Ministry of Education, Culture, Sports, Science and Technology	1980	RIKEN (The Institute of Physical and Chemical Research)	Preservation of microorganism strains
	1997	Center for Genetic Resource Information, at the National Institute of Genetics	Genetic resource database
	1997	Genetic Strains Research Center, at the National Institute of Genetics	Mice, rice plants, and Escherichia coli
	1997	Cell Resource Center for Biomedical Research, at the Institute of Development, Aging and Cancer, Tohoku University	Cells for medical use
	1997	Barley and Wild Plant Resource Center, at the Research Institute for Bioresources, Okayama University	Barley and wild plants
	1997	Institute of Genetic Resources, at the Faculty of Agriculture, Kyushu University	Silkworms
	1998	Institute of Resource Development and Analysis, at Kumamoto University	Genetically engineered animals
	1999	Drosophila Genetic Resource Center, at Kyoto Institute of Technology	Drosophila
	2000	RIKEN (The Institute of Physical and Chemical Research)	Cultured cell lines and genes of higher animals and plants
	2001	Laboratory Animal Resource Center, at the University of Tsukuba	Genetically engineered animals
	2002	Institutes participating in the national bioresource project (RIKEN (The Institute of Physical and Chemical Research))	Mice, arabidopsis thaliana, ES cells, etc.
Ministry of Health, Labour and Welfare	1922	Medicinal Plant Research Stations, at National Institute of Health Sciences	Seed and cultured cells, etc., of pharmaceutical plants
	1978	Tsukuba Primate Center, at National Institute of Infectious Diseases	Primates
	1984	National Institute of Infectious Diseases	Genes (bank)
	1984	National Institute of Health Sciences	Cells (bank)

[24] GIS: Geographic Information System manages and processes location-related data (geospatial data) in an integrated manner, and data visually. Through the above, GIS enables advanced analysis and prompt judgment.

Ministry or agency	Fiscal year established	Name of facility	Type of data provided or preserved
Ministry of Agriculture, Forestry and Fisheries	1985	National Institute of Agrobiological Sciences, etc.	Genetic resources of plants, microorganisms, and animals
	1985	Forestry and Forest Products Research Institute	Genetic resources of forest trees
	1985	Fisheries Research Agency	Genetic resources of fisheries organisms
	1995	National Institute of Agrobiological Sciences, etc.	DNA
	2003	National Institute of Agrobiological Sciences, Rice Genome Resource Center	Rice mutant lines, cDNA, etc.
Ministry of Economy, Trade and Industry	1882	National Institute of Advanced Industrial Science and Technology, Geological Survey of Japan	Geological data (geological maps of the country at a scale of 1:200,000 and 1:50,000, etc.)
	1903	National Institute of Advanced Industrial Science and Technology, National Metrology Institute of Japan	National measurement standards (252 physical standards, 242 reference materials)
	1993	National Institute of Technology and Evaluation, Department of Biotechnology	Genome information and biological resources, including microorganisms and DNA cloning of microorganisms for industrial use
	1996	National Institute of Technology and Evaluation, Chemical Management Center	Comprehensive chemical management information on about 4,600 substances
Ministry of Land, Infrastructure and Transport	1970	Port and Airport Research Institute	Information concerning waves and tsunamis observed along Japanese coasts through a nationwide port and ocean wave information network
	1962	Port and Airport Research Institute	Information concerning strong earthquakes in coastal areas
Ministry of Environment	1983	National Institute for Environmental Studies	Preservation of microorganism strains (1,600 strains)

3.3.3.3 Creation, Protection and Utilization of Intellectual Properties

In order to make unique and innovative achievements in research and feed them back to society and people, it is essential to revitalize the cycle of creation, protection and utilization of intellectual properties, and various initiatives are underway to do so.

In May 2006, the Council for Science and Technology Policy adopted the "Report on the Management of Intellectual Properties," which called for the promotion of the acquisition of international rights related to basic patents, the establishment of a comprehensive search system for research papers and patent information, the enhancement of the international functions of intellectual property management centers established at universities and the development and retention of human resources with expert knowledge related to intellectual properties, and submitted the report to the relevant ministers. In addition, the council, with a view to facilitating the utilization of intellectual properties in research activities conducted by universities, adopted the "Guidelines for Research Licences for Intellectual Property Rights Stemming From Government-Funded Research and Development at Universities, etc." and submitted the guidelines to the relevant ministers.

(1) Establishment of system for managing intellectual properties at universities

Under the University Intellectual Property Headquarters Development Project, universities have been endeavoring to establish model organizations for strategic management of the creation, protection and utilization of intellectual properties since fiscal 2003, with the number of patent applications and implementations by universities increasing year after year (Figure 3-3-21, Table 3-3-22 and Figure 3-3-23). Moreover, Committee on Promotion of Industry-Academia-Government Collaboration, Technology and Research Foundations Section, Council for Science and Technology conducted deliberations on how to strengthen the international functions of universities' intellectual property management centers and on other tasks that must be performed to promote industry-academia government

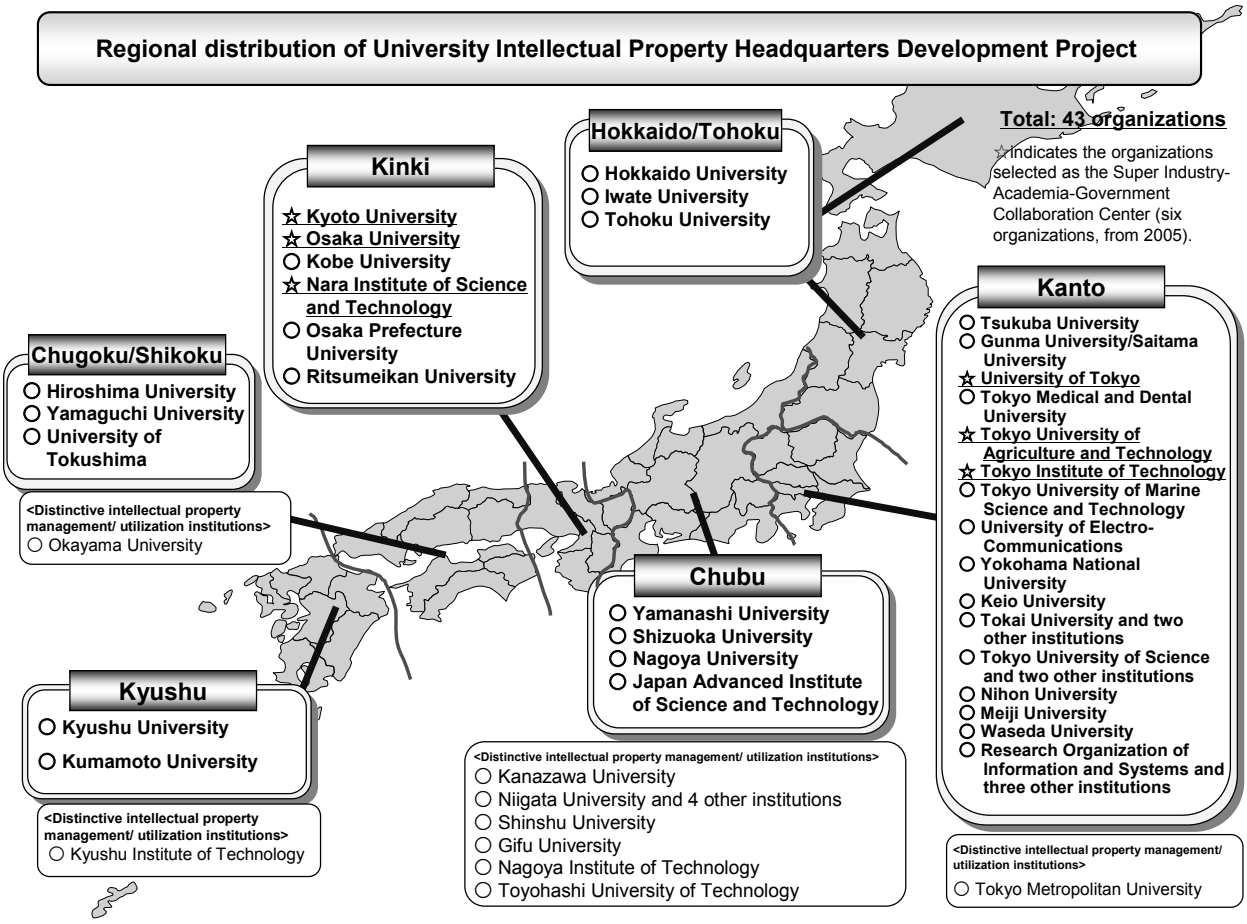


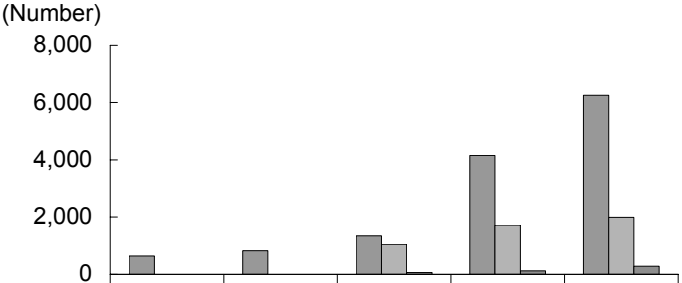
Figure 3-3-21 Regional distribution of University Intellectual Property Headquarters Development Project

Table 3-3-22 Status of improvement of system for management and utilization of intellectual properties (university intellectual property headquarters, etc.) (Fiscal 2005)

	Already improved		Planning to improve (Number)	No improvement plan (Number)	No. of respondent universities (Number)
	(Number)	Number of organizations selected for the improvement program			
Total number	(142) 149	55	(91) 142	(439) 296	(672) 587
National universities, etc.	(71) 72	40	(10) 10	(13) 10	(94) 92
Private universities, etc.	(57) 63	13	(66) 113	(382) 248	(505) 424
Public universities, etc.	(14) 14	2	(15) 19	(44) 38	(73 71

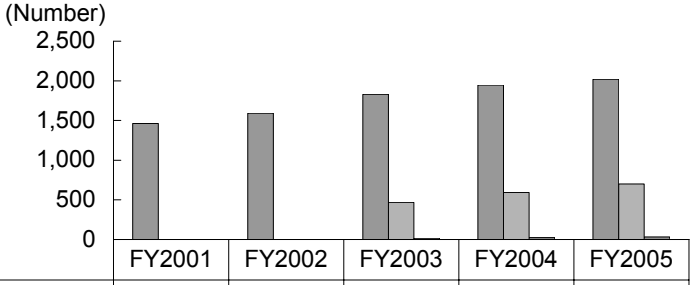
Note: Figures in parentheses in upper columns indicate the previous year's numbers.

(1) Number of patent applications made by universities



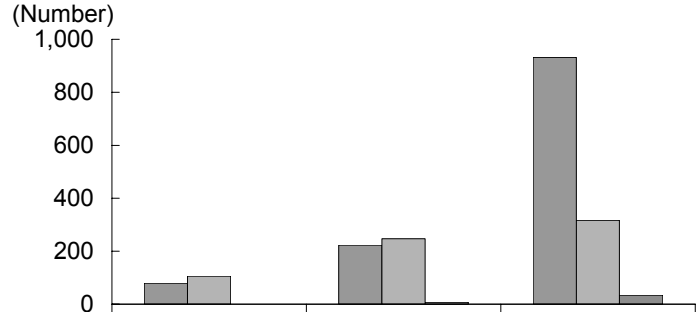
	FY2001	FY2002	FY2003	FY2004	FY2005
National universities, etc.	641	829	1,344	4,152	6,255
Private universities, etc.			1,051	1,720	1,987
Public universities, etc.			67	122	285

(2) Number of patents held by universities



	FY2001	FY2002	FY2003	FY2004	FY2005
National universities, etc.	1,462	1,592	1,829	1,947	2,021
Private universities, etc.			467	591	701
Public universities, etc.			17	25	33

(3) Number of patents implemented by universities



	FY2003	FY2004	FY2005
National universities, etc.	79	223	932
Private universities, etc.	106	247	317
Public universities, etc.	0	7	34

Figure 3-3-23 Creation, protection and utilization of intellectual properties by universities

collaboration on a global scale for the purpose of enhancing Japan's international competitiveness, and the council in August 2006 drew up a report on the status of deliberations conducted thus far (Figure 3-3-24).

In order to promote the transfer of research results achieved by universities to private companies, create new industries and markets by taking advantage of those results and revitalize research activities conducted by universities, the Ministry of Economy, Trade and Industry, in accordance with the Act for Promoting University-Industry Technology Transfer, which was put into force in 1998, provides TLOs (authorized TLOs) whose implementation plans have been approved with subsidies to cover part of expenses related to the transfer of technologies and applications for foreign patents based on research results achieved by universities. Currently, there are 42 authorized TLOs, which have made steady progress in project implementations, with their combined licensing revenues totaling 840 million yen (fiscal 2005).

(2) Promotion of activities related to intellectual properties

In order to enable universities to secure rights to their excellent intellectual properties and exercise the rights, MEXT provides support to activities related to applications for foreign patents through the Technology Transfer Support Center, operated by the Japan Science and Technology Agency.

In addition, the Japan Science and Technology Agency (JST), with a view to facilitating achievements of excellent research results, manages a database of information related to various R&D support measures and research results and distributes such information widely through the Internet. Specifically, there are databases of information related to public research organizations including universities, researchers, research themes and research resources (ReaD) and a database that connects research results achieved by public research organizations including universities with relevant patents (J-STORE). In

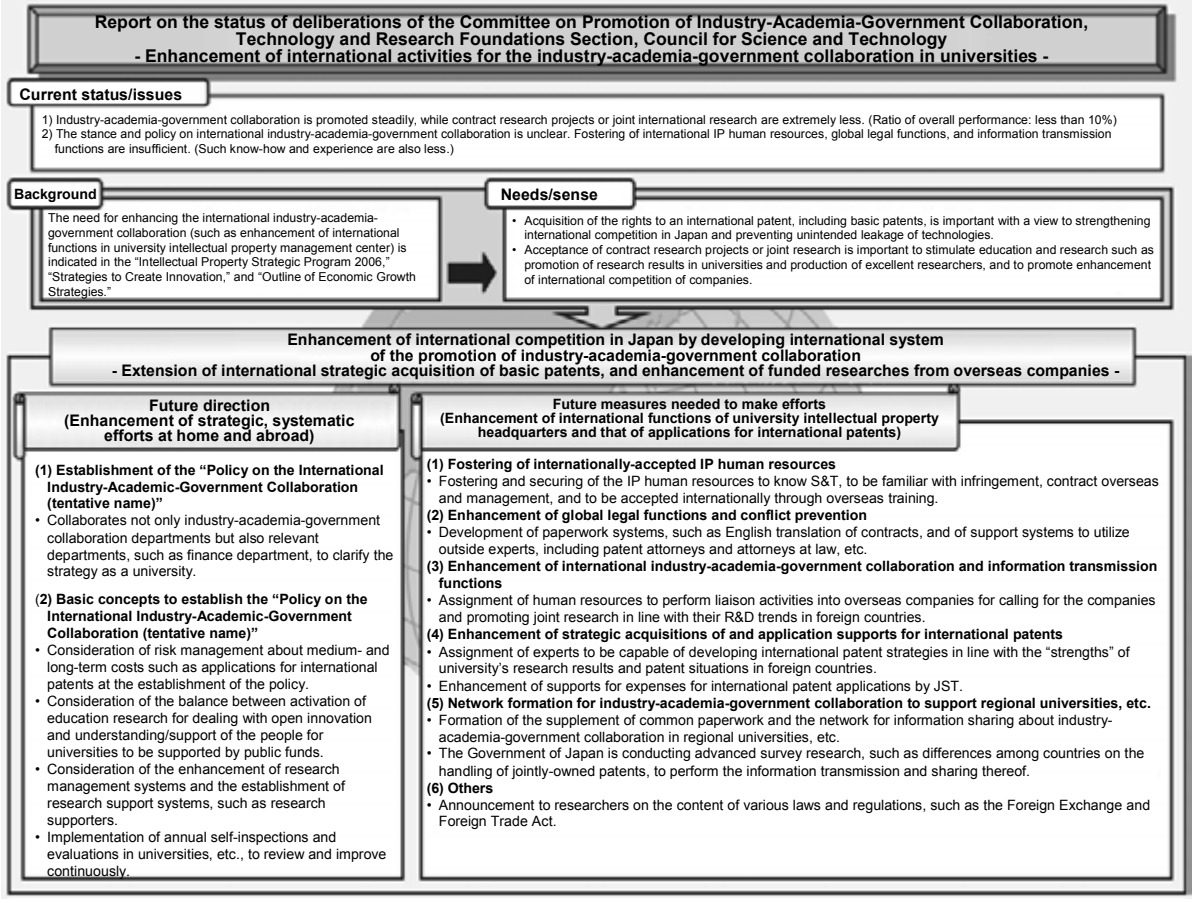


Figure 3-3-24 Report on the status of deliberations of the Committee on Promotion of Industry-Academia-Government Collaboration, Technology and Research Foundations Section, Council for Science and Technology

June 2006, the JST started operating a new system that enables integrated searches of online information related to technology seeds made public by universities, and provides companies with direct access to researchers (e-seeds.jp).

Moreover, the Council for Science and Technology's committee on promotion of industry-academia-government collaboration is conducting deliberations on various problems related to intellectual properties in the life sciences and other advanced science fields based on hearings with experts.

Amid the ongoing globalization of the economy, it is very important, from the viewpoint of enhancing the international competitiveness of Japanese industry, to cultivate an environment that enables speedy acquisitions of intellectual property rights. Therefore, the Ministry of Economy, Trade and Industry in December 2005 established the "Headquarters for Expeditious and Efficient Patent Examination," headed by the Minister of Economy, Trade and Industry. In January 2006, the headquarters drew up an action plan that specified public-private joint initiatives for increasing the number patent applications examined and reforming companies' systems for submitting patent applications, and called for special consideration to be paid in the implementation of the initiatives, and is promoting implementation efforts. In January 2007, the headquarters formulated the "Advanced Measures for Accelerating Reform toward Innovation Plan in Patent Examination 2007," which represented an upgrade of the package of measures that have already been underway, in light of the changes that have occurred in recent years such as the progress made in the international harmonization of patent systems and international cooperation regarding patent examination. This plan sets forth a total of 26 priority items with regard to 1) promotion of acquisition of intellectual property rights around the world and better protection of such properties, 2) further efforts by the Patent Office toward expeditious and efficient patent examination, 3) promotion of strategic intellectual property management by companies and 4) support for utilization of intellectual properties by local communities and small- and medium-sized enterprises. The Ministry of Economy, Trade and Industry is doing its utmost to enhance its intellectual property policy by increasing efforts to ensure expeditious and efficient patent examination with the support of the industrial sector.

Against the background of the globalization of corporate activities, the rapid development of other East Asian countries/regions and the proliferation of counterfeited products in recent years, Japanese companies face a need to reform their intellectual property management strategies. The Patent Office is endeavoring to cultivate an environment that facilitates such reform by encouraging companies, through active exchanges of opinions with corporate managers, to enhance their strategic intellectual property management from a global point of view, and to enhance relevant systems, by further improving the environment for prior art search and by compiling a collection of case studies related to drafting of intellectual property management strategies.

Universities' activities related to intellectual properties have been revitalized in recent years. However, in order to make such activities more effective, it is important for universities to make further efforts to formulate strategies for actively acquiring foreign patents concerning critical inventions and exercising their intellectual property rights.

The Ministry of Agriculture, Forestry and Fisheries in February 2006 established its intellectual property strategy headquarters and in March 2007 formulated its comprehensive strategies concerning intellectual properties, called "Intellectual Property Strategy of the Ministry of Agriculture, Forestry and Fisheries." The ministry also formulated the "Strategies for Research and Intellectual Properties in the Agriculture, Forestry and Fisheries Sector," which specified the matters to be tackled by the ministry itself and measures that should desirably be implemented by research organizations regarding intellectual properties during a process ranging from the research planning stage to the stage of acquisitions of intellectual property rights and transfers of technologies. Moreover, the ministry is supporting the activities of TLOs authorized by the Minister of Agriculture, Forestry and Fisheries and implementing the "Technology Results Transfer Promotion Program" in order to facilitate commercialization of research results achieved by independent administrative agencies engaged in experiments and research.

The Patent Office, in order to promote the establishment of intellectual property management systems by universities, has published "Manual of Intellectual Property Management System at University," which provides specific examples of universities' activities related to intellectual properties, and dispatched "University Intellectual Property Advisors" to universities planning to establish such systems (The advisors were dispatched to 23 universities in fiscal 2006. From January 2007, this program was to be undertaken by the National Center for Intellectual Property Information and Training (INPIT).). In addition, in order to enable small- and

medium-sized enterprises and venture companies to make effective use of patents acquired by universities and made available to others (licensable patents), the Patent Office, through INPIT, dispatches Patent Licensing Advisors (The number of such advisors dispatched totaled 110 as of March 2007.) to technology licensing organizations (TLOs) and local governments so as to match their needs and licensable patents offered by universities. In addition, it publicly discloses information related to licensable patents through a Patent Licensing Database.

Moreover, the Patent Office conducts technology trend surveys on notable technologies, mainly technologies in the four fields targeted for prioritized promotion and in four other sectors targeted for promotion under the Third Science and Technology Basic Plan and technologies in industries which have grown remarkably in recent years or industries whose technological innovations have a particularly great impact, with a view to grasping the status of patent applications related to those technologies and clarifying the direction of R&D activities through analysis of relevant patent information. The Patent Office disclosed the results of this survey in order to contribute to R&D activities conducted by companies and universities and to their formulation of patent strategies. As a way to help companies and universities acquire and utilize patents based on their excellent research results, the Patent Office, through INPIT, is building up and operating the Industrial Property Digital Library (IPDL), which allows users to search and identify necessary patent-related information through the Internet. The IPDL has continuously been improving user convenience and expanding the range of its services. In fiscal 2006, the new function of allowing users to search Japanese and foreign patent gazettes (summaries in Japanese) through the same search window was added to the IPDL.

On May 23, 2006, the Council for Science and Technology Policy formulated the "Guidelines for Research Licenses for Intellectual Property Rights Stemming From Government-Funded Research and Development at Universities, etc." in order to facilitate the use of intellectual property rights by universities as centers for knowledge creation, and promote free R&D activities by them. In addition, the Council for Science and Technology Policy formulated the "Guidelines for Facilitating the Use of Research Tool Patents in the Life Sciences Fields," which expresses basic ideas concerning the utilization by universities and private-sector companies in research of patents related to research tools such as genetically engineered animals and screening methods, with a view to promoting R&D in the advanced technology field of life sciences, leading research results to innovations and enhancing Japan's international competitiveness.

3.3.3.4 Active Efforts toward Standardization

In order to achieve international standards in the information and communications field originating from Japan, and to promote the strengthening of Japan's international competitiveness, "research and development targeting international technological standardization" is being implemented based on research results solicited on the condition that proposed research should contribute to standardization activities, such as submitting proposals to standardization organizations like the International Telecommunication Union (ITU). In fiscal 2006, three research projects were adopted under this program. In addition, due to the recognition that it is important to promote R&D and standardization together as a unit, ubiquitous network technology, etc. is being promoted in consideration of contributions to future international standards. Furthermore, the ITU is active in standardization activities for the NGN (next generation network) that is a basic technology indispensable for the realization of a ubiquitous network society. The ITU is also expected to conduct full-scale standardization activities for home networks and RFID. Japan has made proactive proposals on the standardization system for these technologies. Moreover, coordination of standardization activities in Asian countries is being strengthened, and joint proposals for standardization to the ITU are being promoted through the Asia-Pacific Telecommunity Standardization Program (ASTAP).

In order to achieve international standards originating from Japan, the Ministry of Economy, Trade and Industry is actively striving toward international standardization in technology fields in which Japan excels, such as nanotechnology, robotics, photocatalysts and electronic tags, by setting strategic targets for international standardization. At the same time, in order to promote R&D and standardization in an integrated manner, the ministry is promoting clear positioning of standardization strategies in R&D projects. Moreover, the ministry is conducting R&D for the purpose of standardization under the Program for the Development of International Standards. In fiscal 2006, it started research concerning the "standardization of materials for MEMS (Micro Electro Mechanical Systems) devices," etc., bringing the total number of themes covered by standardization research to 30 as of that year.

Regarding the development of human resources related

to standardization, the ministry developed education materials concerning standardization intended for broad use at universities (undergraduate and graduate courses) and private-sector companies and provided training courses to foster personnel with expertise in the establishment of standards.

3.3.3.5 Improvement of Research Information Infrastructure

The research information infrastructure is regarded as a critical life line for research activities. Therefore, improving the research information infrastructure in response to the rapid progress in information and communications technology is essential for securing the international competitiveness of Japan's R&D activities. The government is thus taking concrete actions such as the development and upgrading of networks between research institutions and the development and provision of databases.

(1) Improvement of networks

Computers and information networks are key systems in our modern society. These were first developed for research and development, and afterwards found a variety of different applications. In order to carry out cutting edge research and development, performance enhancements are necessary for networks.

The National Institute of Informatics (NII), an organization under the control of the Ministry of Education, Culture, Sports, Science and Technology, has established and operates the Science Information Network (SINET), which connects organizations such as universities. As of the end of December 2006, a total of 709 organizations were connected to SINET. In addition, "Super SINET," the world's fastest research network, which connects advanced scientific research institutions at a maximum speed of 10Gbps (gigabits per second), is now up and running.

By establishing the Advanced Network Testbed for R&D (JGN II[25]), operated by the National Institute of Information and Communications Technology, the Ministry of Internal Affairs and Communications promotes the pacesetting approaches that create an extensive ripple effect such as improvements in technological capabilities in Japan, reinforcement of collaboration between industry, academia and government, and creation of new businesses and industries, through R&D and testing.

The Ministry of Agriculture, Forestry and Fisheries has established and operates the MAFFIN (Ministry of Agriculture, Forestry and Fisheries Network), which mutually connects research institutions related to agriculture, forestry, and fisheries. As of the end of March 2007, a total of 95 institutions were connected through MAFFIN. With MAFFIN linked to the Philippines, this network is now becoming a backbone for the distribution of research information among various countries.

(2) Creation and provision of databases

Perusal, copying, lending, and other clearing services for source materials for research papers, etc. (primary information) are being implemented at libraries and a variety of other information service organizations. In addition, constructing databases of excerpts and indexes (secondary information) by using computers enables the swift, accurate and easy search of increasingly large amounts of information.

In order to create a database of primary information, the National Diet Library (NDL) is preparing a database for collected materials that covers every publication issued in Japan and in the archives of the library. The National Institute of Informatics (NII), an organization under the control of the Ministry of Education, Culture, Sports, Science and Technology, creates and provides databases on titles and locations of academic books and magazines available at university libraries and other institutions, with the cooperation of institutions nationwide such as national, public, and private universities. Furthermore, the NII creates databases for academic research, and provides a database service.

The Japan Science and Technology Agency collects information related to science and technology from both Japanese and foreign sources, compiles their summaries, builds up technology document databases and provides a text search service through the Internet. From April 2006, this search service, with its search function enhanced, has been provided under the name of JDream II (JST Document REtrieval system for Academic and Medical fields). Moreover, the agency is building an electronic archive of major journals published by academic societies in the science and technology fields for distribution worldwide through the Internet. In addition, since fiscal

[25] JGN II: JGN II is a nationwide IP network that provides the environment for R&D related to a wavelength division multiplex network as an optical testbed. R&D cooperation with domestic and foreign research institutions is underway with the use of lines established for connection with the USA and Asia.

2006, the Cabinet Secretariat's secretariat of intellectual property strategy headquarters, MEXT and the Patent Office of the Ministry of Economy, Trade and Industry have been collaborating to build an integrated search system for document information such as research papers and patent information.

The Ministry of Agriculture, Forestry and Fisheries, with a view to enhancing its dissemination of information, is implementing measures such as digitization of research results and other information related to the development of technologies in the agriculture, forestry and fisheries sector and providing information widely through the Internet. Specifically, the ministry is creating Agropedia[26], which is an agricultural information database that integrates a database of digitized research reports in the agricultural, forestry and fisheries sector written by independent administrative institutions engaged in experiments and research under the ministry's jurisdiction, national and public research organizations and universities, a database of Japanese and foreign agricultural research documents, a database of weather satellite images and a database of themes of research conducted by research organizations.

Moreover, the ministry creates and offers information on documents related to the agriculture, forestry, and fisheries fields, as well as information on locations of books and materials, such as providing the Japanese Agricultural Sciences Index (JASI) of articles published in academic journals related to the agriculture, forestry, and fisheries fields online.

The outlines of major measures implemented in relation to the research information infrastructure are as shown in Table 3-3-25.

Table 3-3-25 Main measures for the research information infrastructure (FY2006)

Ministry or Agency	Research institute or program	Subject
Diet	National Diet Library	・Acquisition and development funds for science and technology-related resources at the National Diet Library
Cabinet Office		・Strengthening the information collection function of R&D data funded through the government budget
Ministry of Internal Affairs and Communications	National Institute of Information and Communications Technology	・Establishment of advanced network testbed for research and development (JGN II)
Ministry of Education, Culture, Sports, Science and Technology	RIKEN (The Institute of Physical and Chemical Research)	・Research funds for IT utilization
	Japan Science and Technology Agency	・Construction of R&D databases (ReaD, J-STORE etc.) ・Development of engineer ability and operation of “failure knowledge database” (“Web Learning Plaza” etc.) ・Operation of Institute for Bioinformatics Research and Development (BIRD, GBIF etc.) ・Operation of Science and technology information provision system (JDream II, J-STAGE etc.)
	Japan Agency for Marine-Earth Science and Technology	・Information infrastructure operating costs
	National Institute of Informatics	・Development of Scientific Information Network (”Super SINET” etc.)
Ministry of Health, Labour and Welfare	National Institute of Infectious Diseases	・Budget for the Infectious Disease Surveillance Center ・Research project expenses for collecting, analyzing, and assessing safety data on biological drugs
Ministry of Agriculture, Forestry and Fisheries	National Agriculture and Bio-oriented Research Organization	・Operation of Agriculture, Forestry and Fisheries Research Information Center (JASI etc.) ・Operation of Computer Center for Agriculture, Forestry and Fisheries Research (MAFFIN etc.)

[26] Agropedia: A word coined by combining "agriculture" and "encyclopedia".

Ministry or Agency	Research institute or program	Subject
Japan Patent Office	National Center for Industrial Property Information and Training	・Industrial Property Digital Library (IPDL) ・IPDL public gazette fixed address service for universities, etc. ・Public viewing service using patent examiner terminals
Ministry of Land, Infrastructure and Transport	Hydrographic and Oceanographic Department, Japan Coast Guard	・Promotion of collection, management and provision of hydrographic and oceanographic data/information ・Development of Geographic Information System (GIS) database for the coastal area
Ministry of the Environment		・Funds for development of basic information for comprehensive ecosystem management
Cabinet Office Ministry of Education, Culture, Sports, Science and Technology Japan Patent Office	Japan Science and Technology Agency National Center for Industrial Property Information and Training	・Improvement of a comprehensive search system for patent and document information

3.3.3.6 Promotion of Activities of Academic Societies

Academic societies and associations are voluntary organizations made up of researchers of organization such as universities. They play an important role in terms of research evaluation, and also information and personal exchange, beyond the framework of individual research organizations. Major contributions are made to the advancement of academic research through activities of academic societies, such as the dissemination of the latest exceptional research results via academic research meetings, lectures, and symposia, and through the publication of academic journals.

To promote these types of activities by academic societies, Grant-in-Aid for Publication of Scientific Research Results, which is one of the categories of Grants-in-Aid for Scientific Research, are awarded by the Ministry of Education, Culture, Sports, Science and Technology to support activities such as international conferences held in Japan with the participation of overseas researchers; symposia that provide youths and adults with up-to-date information on research trends, and the publication of academic journals.

The Science Council of Japan conducted a questionnaire survey and held hearings with major academic societies with a view to grasping the status of such societies' activities, conducted a survey on U.S. and European academic societies that have strong information dissemination capabilities, and held a symposium entitled "On the Future of Academic Societies," in which a broad range of people including representatives of academic societies and researchers participated.

(Enhancement of international competitiveness of academic societies)

The Japan Science and Technology Agency, with a view to enhancing Japan's capability to disseminate information concerning research results, is supporting globalization efforts related to academic journals and research papers by establishing J-STAGE (Japan Science and Technology information AGgregator, Electronic), a comprehensive system for dissemination of science and technology information that computerizes processes such as contributions of research papers to academic journals and examination/screening and disclosure thereof.

3.3.4 Strategically Promoting International Activities

With the advent of an era of fierce global competition for technology, human resources and other elements of knowledge, international activities related to science and technology have become more important than ever.

For its part, Japan must conduct international activities in the science and technology fields in a strategic manner, by making contributions to the international community through efforts to tackle global problems and enhancing collaboration with other Asian countries in line with initiatives adopted at the East Asia Summit.

From this viewpoint, the government, in accordance with the Third Science and Technology Basic Plan, which was decided by the Cabinet in March 2006, has clarified its strategic vision of international activities and is promoting collaboration with other Asian countries, the fostering of researchers capable of working across national borders, and international standardization efforts (See 3.3.3.4), and is striving to cultivate a favorable environment for conducting international activities that support these efforts.

3.3.4.1 Systematic Efforts for International Activities

Science and technology create intellectual properties to be shared by mankind as a whole and contribute to resolving various global problems. Conducting science and technology activities across national borders strenuously is important for Japan as it seeks to play a proactive role in the international community and develop the country's science and technology. Therefore, the government is promoting international collaboration both within multilateral frameworks such as the OECD (Organization for Economic Cooperation and Development) and on a bilateral basis in light of the needs of the partners and the level of their science and technology.

(1) Summit Meeting of Group of Eight (G-8) countries

At the G-8 summit held in July 2006 in St. Petersburg, energy security, education and infectious diseases were discussed as major topics. The discussions covered issues such as the development of nuclear energy, the promotion of the ITER project, the importance of international science and technology cooperation concerning infectious diseases and the establishment of innovation-oriented society through education.

(2) United Nations (UN)

The United Nations is taking measures regarding the prevention of disasters and observing the Earth in the field of science and technology. Japan is especially participating and cooperating in various science projects/activities of UNESCO (the United Nations Educational, Scientific, and Cultural Organization).

UNESCO is tackling global water-related problems through the International Hydrological Program (IHP). Japan, in March 2006, established the International Center for Water Hazard Risk Management (ICHARM) in Tsukuba City, and the center is conducting activities such as research concerning water-related disasters and relevant risk management, training and the establishment of an information network. In addition, Japan dispatched experts to the Intergovernmental Oceanographic Commission (IOC), which is responsible for activities such as oceanographic observation related to climate change and the establishment of a tsunami warning system, and contributed to discussions conducted in the International Bioethics Committee (IBC) by dispatching experts to the committee.

(3) Organisation for Economic Co-operation and Development (OECD)

The Organisation for Economic Co-operation and Development (OECD) works through its Committee for Scientific and Technological Policy (CSTP), Committee for Information, Computer and Communications Policy (ICCP), Committee on Industry, Innovation and Entrepreneurship (CIIE), Committee for Agriculture (AGR), Environment Policy Committee (EPOC), Nuclear Energy Agency (NEA), International Energy Agency (IEA) and others to engage in activities related to science and technology, including the exchange of opinions, experiences, information and personnel between member countries, preparation of statistical information and implementation of joint research.

Under the CSTP, there are five subgroups --the Global Science Forum (GSF), the ad hoc Working Group on Steering and Funding of Research Institutions (SFRI),, the Working Party on Innovation and Technology Policy (TIP), the Working Party on Biotechnology (WPB) and the Working Party of National Experts on Science and Technology Indicators (NESTI). Specific activities of these subgroups under the leadership of Japan are as

follows.

1) Global Science Forum (GSF)

GSF was established as a forum for science and technology policymakers to exchange opinions and make recommendations concerning important issues in the science and technology sector that require international cooperation and concerted action. Against the background of growing interest in the prevention of inappropriate scientific activities following cases of research data forgery around the world, the Workshop on Best Practices for Ensuring Scientific Integrity and Preventing Misconduct was held in February 2007 under the sponsorship of the OECD and MEXT in order to conduct intensive deliberations on measures to tackle the issue of misconduct within an international framework. At the workshop, active discussions were conducted under Japan's strong initiative.

2) Ad Hoc Working Group on the Steering and Funding of Research Institutions (SFRI)

This group was established to provide a place for discussions about issues concerning science and technology-related human resources. As a brain drain and other such issues concerning science and technology-related human resources have been raised by many countries, the Workshop on the International Mobility of Researchers was held in March 2007 under the sponsorship of the OECD, MEXT and the Japan Society for the Promotion of Science in order to take up the issue of international mobility of researchers in particular and discuss the possibility of implementing policy measures for resolving the problem of unilateral brain drain from a specific country to another country and creating a bilateral flow of excellent researchers. Japan explained, as model cases, pioneering initiatives made by several universities in relation to international activities, thus exhibiting its efforts in this regard to other countries and exerting its initiative in leading the discussions at this workshop.

3) Working Party on Innovation and Technology Policy (TIP) (TIP: A group intended mainly to enhance productivity, promote the creation and utilization of knowledge, ensure sustainable growth and create jobs for engineers with advanced skills)

TIP discusses and evaluates technology policies in relation to industry-academia-government collaboration and the intellectual property system, focusing in particular on the National Innovation System (NIS). In 2005 and 2006, discussions were held about the evaluation of innovation policies, globalization and open innovation, intellectual property rights/innovation/diffusion of knowledge and China's NIS, etc.

4) Working Party on Biotechnology (WPB)

The WPB conducts deliberations on investigations and analysis related to biotechnology and policy recommendations to be presented to the national governments of member countries.

In fiscal 2006, discussions were conducted about a framework of a global network for biological resource centers which is intended to provide efficient access to countries' microbe resources. Regarding handling of clinical genetic data including personal information, discussions were held on a drafting of the Guidelines for Quality Assurance in Molecular Genetic Testing, which would be commonly used by OECD member countries.

5) Working Party of National Experts on Science and Technology Indicators (NESTI)

NESTI was established mainly to conduct adjustments and provide advice concerning science and technology-related statistics provided to the CSTP. It conducts discussions and examination regarding frameworks for international comparison and investigation methods regarding science and technology-related indexes such as those concerning research expenses and human resources as well as regarding the development of such indexes. In addition to participating in NESTI as a bureau member, Japan joined a working group concerning the formulation of guidelines for surveys on the careers of doctoral degree holders that was deliberated at a meeting of NESTI in February 2006 and contributed to the drafting of the guidelines.

(4) Promotion of the Human Frontier Science Program (HFSP)

The "Human Frontier Science Program (HFSP)" was proposed by Japan at the Venice Summit of June 1987, with the aim of promoting, through international cooperation, basic international joint research focused on the elucidation of the complex mechanisms of living organisms. With the addition of New Zealand, which joined this program in 2006, now a total of twelve nations are operating this program, including Japan, the United States, France, Germany, EU, Great Britain, Switzerland, Canada, Italy, Australia, and the Republic of Korea. Specifically, this program provides research grants to subsidize international joint research teams, fellowships

to subsidize travel expenses, accommodation, and other expenses for young researchers conducting research abroad, while organizing meetings of HFSP grant recipients.

With a total of 12 HFSP grant recipients having later been awarded the Nobel Prize as of FY2006, the program has been highly acclaimed worldwide. Japan has been actively supporting the program since its inception.

(5) Cooperation under the International Science and Technology Center (ISTC)

In March 1994, Japan, the United States, the EU (then the EC), and the Russian Federation established the International Science and Technology Center (ISTC) in order to provide an opportunity for scientists and engineers from the former Soviet Union, possessing knowledge and skills related to weapons of mass destruction, to engage in peaceful activities and to contribute to the resolution of technology issues, both internationally and within the nations of the former Soviet Union.

The number of projects supported by private-sector corporations as partner projects has also been increasing due to the high caliber and originality of science and technology in the former Soviet Union. In light of this, Japan is actively involved in the expansion of the number of new participants, and in the implementation of projects that contribute to the resolution of global issues.

(6) International activities conducted by Science Council of Japan

The Science Council of Japan represents Japan through its affiliation with 48 international scientific organizations, including the International Council for Science (ICSU[27]) and the Inter Academy Panel on International Issues (IAP[28]). It has been striving for cooperation with various countries by actively taking part in international academic cooperative projects, including the International Geosphere-Biosphere Programme (IGBP[29]).

In addition, the Science Council of Japan dispatches bilateral academic exchange missions to academic conferences held abroad for exchanges of views and information, and since 2005, it has been participating in the issuance of joint statements by science councils of the G-8 countries from a scientific viewpoint with regard to the agendas of annual G-8 summits. In June 2006, the Science Council of Japan issued a joint statement with science councils of the G-8 countries and other nations concerned (China, India, Brazil and South Africa) regarding energy and infectious diseases, which were major agenda items at the G-8 summit held in July in the Russian city of St. Petersburg, and the council's chairman handed the joint statement to the Japanese Prime Minister. As themes of the G-8 academic councils for 2007, the IAC at a board meeting on January 29-31 considered 1) innovation and intellectual property protection and 2) climate protection from the viewpoint of energy efficiency and discussed the idea of linking these themes to aid to Africa, which was a major theme of the G-8 summit.

Moreover, the Science Council of Japan holds annual symposiums on ways to resolve global problems, with the participation of researchers from around the world and from a wide range of fields. In September 2006, it held a symposium entitled "- Global Innovation Ecosystem - International Conference on Science and Technology for Sustainability 2006" in Kyoto.

In addition, the Science Council of Japan, upon Cabinet approval, cosponsors with domestic academic bodies key international academic conferences held in Japan. In fiscal 2006, it cosponsored eight international conferences, including the 20th International Congress of Biochemistry and Molecular Biology.

Meanwhile, the Science Council of Japan serves as the secretariat of the Science Council of Asia (SCA), which comprises science councils of 11 Asian countries. The SCA, with a view to promoting collaboration among Asian countries in academic fields, holds annual meetings with the sustainable development of Asia as the main theme and with the host country changing from year to year. In April 2006, the SCA's sixth meeting was held in India.

[27] ICSU (International Council for Science): The ICSU was founded in 1931 as a non-government, nonprofit organization in order to promote international activities in the fields of science and its applications for the benefit of humanity.

[28] IAP (InterAcademy Panel on International Issues): The IAP was founded in 1995 as a forum of science academies around the world. The Science Council of Japan is serving as a member of the IAP's Executive Committee for the period between 2006 and 2009.

[29] IGBP (International Geosphere-Biosphere Programme): The IGBP, sponsored by the ICSU, was launched in 1986 in order to provide a framework for international and interdisciplinary scientific research regarding the phenomenon of global change.

3.3.4.2 Cooperation with Asian Countries

(1) Cooperation with China and Republic of Korea

In addition to its bilateral collaboration with China and the Republic of Korea, Japan formed a trilateral partnership with them in accordance with the Action Strategy on Trilateral Cooperation, which was approved at the summit meeting of the three countries held in November 2004, and held the First Trilateral Korea-Japan-China Ministerial Meeting on Science and Technology Cooperation in Seoul in January 2007 (From Japan, Minister of Education, Culture, Sports Science and Technology Ibuki attended this meeting.). At this meeting, Japan, China and the Republic of Korea confirmed the basic principle of attaching importance to their science and technology collaboration in efforts to tackle regional challenges related to the environment, energy, disaster prevention and infectious diseases. Based on a decision reached at this meeting, the Workshop for the Trilateral Science and Technology Cooperation was held in Fukuoka in March 2007 under the sponsorship of MEXT in order to conduct deliberations on specific collaborative measures to be implemented in the future in the environment and energy fields.

(2) Cooperation with Association of Southeast Asian Nations (ASEAN)

For the past several years, cooperation among the ASEAN COST+3, which combines ASEAN COST (ASEAN Committee on Science and Technology) with Japan, China and the Republic of Korea, has been underway mainly under MEXT's leadership. In August 2006, the first meeting of the ASEAN COST+3, which is ministerial level was held in Malaysia. At this meeting, Japan put forward proposals concerning infectious diseases and disaster prevention.

(3) Cooperation with Asia-Pacific Cooperation Forum (APEC)

Based on the results of the fourth Meeting of Ministers responsible for Science and Technology (March 2004), the Industrial Science and Technology Working Group has been overseeing projects regarding the development of science and technology-related human resources. Currently, the APEC Center for Technology Foresight in Thailand and MEXT's National Institute of Science and Technology Policy are jointly undertaking a project related to a roadmap of technologies for tackling emerging and re-emerging infectious diseases.

In addition, the "Symposium on the Predictability of the Climate Variations in the Indo-Pacific Sectors" was held in Tokyo in March 2007 under the co-sponsorship of the APEC Climate Center, the Japan Society for the Promotion of Science and the Japan Agency for Marine-Earth Science and Technology.

(4) Cooperation with various countries (major recent activities)

Regarding cooperation with Indonesia, the Asia Disaster Reduction Science & Technology Forum was held in Jakarta in December 2006 under the leadership of Japan, with the participation of experts on disaster prevention/mitigation technologies from around Asia.

With Vietnam, Japan signed the Agreement between Japan and Vietnam on Co-operation in Science and Technology in August 2006 and held the first Japan-Vietnam Joint Committee on Cooperation in Science and Technology in Tokyo in March 2007.

Regarding cooperation with India, a Japan-India Science and Technology Initiative Meeting was held in Tokyo in October 2006 under the co-sponsorship of MEXT and the Ministry of Foreign Affairs with the participation of government officials, researchers and other people concerned in the science and technology fields, as a follow-up of the results of the seventh meeting of the Japan-India Science and Technology Cooperation Joint Committee (November 2005). Based on the results of this meeting, the two countries will promote bilateral joint researches in the fields of ICT (information and communications technologies), biotechnology, and nanotechnology.

(5) Cooperation on a project basis

(Sentinel-Asia project)

In order to deal with the growing incidence of large-scale natural disasters in recent years, it is becoming increasingly important for various countries to collaborate to operate a satellite-based disaster surveillance system that is not affected by ground-level conditions. Japan has participated, through the Asia-Pacific Regional Space Agency Forum (APRSAF), which is sponsored by Japan, in efforts to establish the Disaster Management Support System in the Asia-Pacific Region (Sentinel Asia) within an international collaborative framework that involves 19

countries, 44 organizations and 8 international institutions. The operation of the system, which provides information concerning disaster areas such as satellite images through the Internet to allow partners to share the information, has already started.

(Program to establish centers for research concerning emerging and re-emerging infectious diseases)

Japan is promoting research concerning emerging and re-emerging infectious diseases at research centers established in countries where outbreaks of such diseases have occurred or are expected to occur (Thailand, Vietnam and China), as well as at domestic research centers. Japan is also engaged in human resource development in this regard.

(Research and Development for Supporting Humanitarian Demining of Anti-Personnel Mines)

Under this project, R&D efforts are underway to detect mines more safely, accurately, and efficiently based on the results of field tests. In fiscal 2006, an evaluation test was conducted in Cambodia, through the Grant Aid for Scholarship and Research provided by the Ministry of Foreign Affairs, on prototype landmine detectors that were developed under this project.

(Science and Technology Ministers' Round Table Meeting)

The Cabinet Office, with a view to strategic promotion of international activities related to science and technology, held a meeting of Science and Technology Ministers' Round Table Meeting in September 2006 with the participation of relevant ministers from 29 countries (including Japan). In addition, bilateral policy dialogue was held.

(The Informal Ministerial Meeting on Science and Technology Between ASEAN and Australia, China, India, Japan, Korea and New Zealand)

The Cabinet Office held the first Informal Ministerial Meeting on Science and Technology Between ASEAN and Australia, China, India, Japan, Korea and New Zealand, which involved a total of 16 countries, including ASEAN member countries, the Republic of Australia, China, India, Japan, Korea and New Zealand, in Malaysia in August 2006. A proposal at this meeting had been incorporated in the Third Science and Technology Basic Plan. In addition, Japan held an International Expert Meeting on Open Access DataBase (OADB) for promoting joint research and personnel exchanges among various countries in Tokyo in February 2007 as part of its strategic international activities. This database was proposed by Japan at the first meeting and supported by the participating countries.

3.3.4.3 Cooperation with Countries in Europe and North America

Cooperative activities such as holding joint committee meetings based on bilateral science and technology cooperation agreements with European and North American countries are actively being carried out in order to resolve common challenges faced by advanced countries, including those in life sciences, nanotechnology/materials, environmental sciences, nuclear energy, and space development. As for the United States, in accordance with Agreement between the Government of Japan and the Government of the United States of America on Cooperation in Research and Development in Science and Technology, the 10th meeting of the Japan-U.S. High-Level Committee on Science and Technology was held in May 2006. From Japan, the Minister in Charge of Science and Technology Policy and the Minister of Education, Culture, Sports, Science and Technology attended this meeting.

Elsewhere, there are joint committees and consultations on science and technology with the United Kingdom, Germany, France, Italy, Sweden, Finland, Norway, Netherlands, Russia, Poland, the Czech Republic, and Hungary, etc based on science and technology cooperation agreements (Japan has concluded international agreements, including science and technology cooperation agreements with 44 nations around the world.) At present, Japan is at the final stage for negotiations with the EU for concluding the Japan-EC Science and Technology Cooperation Agreement and is conducting negotiations with Switzerland to conclude a science and technology cooperation agreement.

3.3.4.4 Cooperation with Other Countries

In relations with Australia, Israel and South Africa, among other countries, under agreements for science and technology cooperation, partnership is enhanced in the

form of information and research personnel exchanges, and the implementation of joint research. Opinion exchanges on the possibility of future cooperation are also being pursued with other countries that have not signed science and technology cooperation agreements with Japan.

3.3.4.5 Taking on International Projects

(1) ITER Project

The goal of the ITER project is to construct and operate a tokamak experimental fusion reactor through international cooperative efforts, in order to demonstrate the scientific and technological feasibility of fusion energy, which is expected to become one of the future permanent energy sources for humanity. Currently, seven parties are participating: Japan, China, EU, the Republic of Korea, Russia, the United States, and India. In addition, Japan plans to implement a Japan-EU joint R&D project (the "Broader Approach" for the development of nuclear fusion technology) in parallel with the ITER project. The ITER Agreement was signed in November 2006, and Agreement for the implementation of the Broader Approach was signed in February 2007.

(2) International Space Station (ISS) Program

The International Space Station (ISS) program, in which five parties (Japan, the United States, Europe (11 countries), Canada, and Russia) are participating, is an international cooperation project intended to construct a space station in low Earth orbit. As part of this project, Japan is developing the Japanese Experiment Module (JEM), which is also known as "Kibo," and a space-station supplier called H-II Transfer Vehicle (HTV).

"Kibo" is expected to be launched in stages in three separate Space Shuttle missions in fiscal 2007 through fiscal 2008. The crew of the first of these Space Shuttle missions will include Japanese astronaut Takao Doi and the crew of the second mission will include another Japanese astronaut, Akihiko Hoshide. In addition, it has been decided that astronaut Koichi Wakata will be stationed in the ISS for a long-term stay immediately before the third of those Space Shuttle missions, becoming the first Japanese to be given such an assignment.

(3) Integrated Ocean Drilling Program (IODP)

The IODP is a program, under the direction of the United States and Japan, to explore the deep parts of the Earth using internationally operated vehicles such as internationally available scientific drilling vessels and the Japanese riser drilling vessel "Chikyu," which, with a capability of drilling from the deep ocean floor to 7000 m below the bottom of the ocean, is anticipated to reach the earth's mantle. In April 2003, a memorandum was signed between the Ministry of Education, Culture, Sports, Science and Technology and the National Science Foundation of the United States, and the IODP began in October of the same year. According to the program, research on the deep parts of the Earth and inner strata is promoted; the program is thus expected to make contributions to our understanding of the global environmental changes, the structure of the inner Earth, etc., and possibly even lead to a discovery of an unknown biosphere and new resources.

A shakedown operation of "Chikyu," was completed in July 2005 in the northwest Pacific off Shimokita Peninsula, north of Japan, to prepare for its first drilling and research voyage mission in the Sea of Kumano in the IODP, scheduled to begin in September 2007 with a view to clarifying the mechanism of how does a gigantic earthquake in the Tonankai region occur.

(4) The Large Hadron Collider (LHC) Project

The LHC Project includes a huge circular accelerator whose circumference reaches 27 km, which is being constructed by the European Organization for Nuclear Research (CERN). Protons and antiprotons are accelerated in opposite directions, almost to the speed of light, and they generate high energy interactions when protons collide. In this project unknown particles may be discovered, deepening our understanding of the internal structure of things. The construction is almost completed, with international cooperation among the CERN member states, Japan, the United States, and other nations, so that the experiments could begin in 2008.

In Japan, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) contributes to the fund for construction of the particle accelerator, anticipating its scientific significance as well as its potential to lead the progress in advanced technology.

3.3.4.6 Cultivation of Environment for Enhancing International Activities and Promotion of Researcher Exchanges

(1) Promotion of international research activities

It is necessary to gather superior human resources and the latest information in Japan, and promote the internationalization of science and technology activities in order to respond to challenges that human beings will be facing.

To this end, Japan is promoting activities such as international joint research and international conferences through programs such as the "Asia Science and Technology Strategic Cooperation Promotion Program," financed by Special Coordination Funds for Promoting Science and Technology, "Strategic International Cooperative Program," run by the Japan Science and Technology Agency, and "JSPS Core-to-Core Program," run by the Japan Society for the Promotion of Science.

In addition, since fiscal 2005, Japan has been supporting the Strategic Fund for Establishing International Headquarters in Universities, and at the selected universities, the organizational structure has been modified to create interdisciplinary, cross-sectional bodies like an "international strategy headquarter" to coordinate the basis for promoting strategies for international activities.

(2) Promotion of researcher exchanges

For the development of science and technology as well as academic research, it is essential that Japan attracts many excellent researchers - both Japanese and foreign - to Japan, and to allow Japanese researchers to compete at a cutting-edge level at the international standard. For this purpose, various researcher-exchange programs are being carried out.

The Japan Society for the Promotion of Science (JSPS), through the JSPS Postdoctoral Fellowship for Foreign Researchers, provides excellent young foreign researchers with opportunities to engage in research at Japanese universities. In addition, it dispatches young Japanese researchers abroad through the Postdoctoral Fellowships for Research Abroad so as to enable them to engage in research at outstanding foreign research organizations and expand opportunities for them to mingle with foreign researchers. Moreover, the JSPS promotes activities such as joint research, seminars and researcher exchanges through bilateral collaboration with foreign science promotion organizations.

Meanwhile, as part of its reform of the immigration control system, Japan extended the maximum allowable period of stay in Japan to five years from three years for foreign people engaged in research activities at facilities of organizations whose operations contribute to efficient implementation of research in fields where advanced expert knowledge is essential. In addition, Japan is endeavoring to promote invitation of foreign researchers and their activities, for example by proposing at APEC meetings the provision of APEC Business Travel Cards (ABTC)[30] to researchers.

As a result of these measures, the numbers of foreign researchers invited and Japanese researchers dispatched overseas have generally been rising at private and national universities and experiment and research institutions over the past years (Figure 3-3-26). In fiscal 2005, the numbers of both researchers dispatched and invited increased about 10% compared with fiscal 2004. By region, there are active researcher exchanges with Asia, Europe, and North America (Figure 3-3-27).

[30] ABTC: The APTC, which is a scheme operated by APEC, allows holders of the card to obtain short-term business visitor entry to participating countries and regions without obtaining visas or going through visa procedures. This card is issued only to business people.

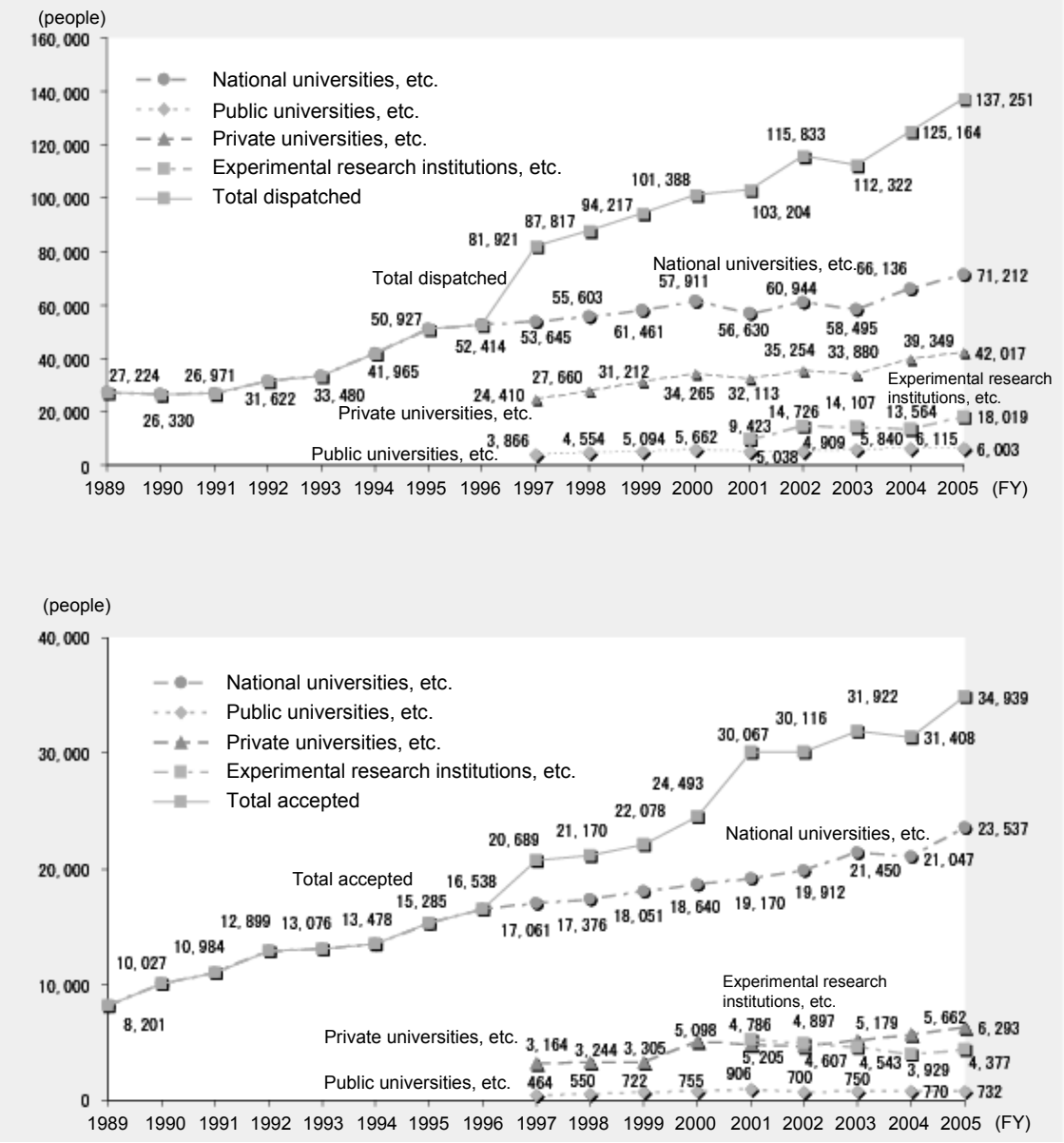


Figure 3-3-26 Trends in researcher exchanges in universities, research institutions, etc.

Note: "National universities, etc." comprise national universities (Between fiscal 1997 and fiscal 2004, "national universities" included national junior colleges, which were integrated with or converted into national universities in fiscal 2005), inter-university research institutes, national junior colleges and national technical colleges.
"Experimental research institutions, etc." comprise national experimental research institutions and incorporated administrative agencies (Between fiscal 2000 and fiscal 2004, "experimental research institutions, etc." included public R&D corporations, which were converted into incorporated administrative agencies in fiscal 2005).
Public and private universities and national junior colleges have been covered by this survey since FY1997. National technical colleges, national experimental research institutions, and public R&D corporations have been covered since FY2000.
Source: MEXT. "Survey of International Exchange (FY2005)"

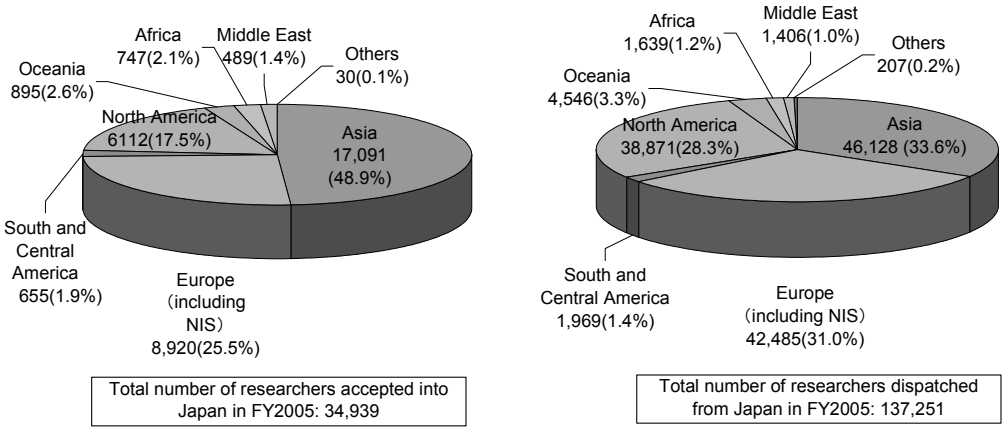


Figure 3-3-27 Researcher exchanges (dispatch and acceptance) by region