researchers. Since FY2011, through the basic research promotion system in MLIT's transport sector, efforts have been made in enhancing grants for young researchers and female researchers. Measures continued from the previous year to support young researchers include MIC's "Strategic Information and Communications R&D Promotion Program," MHLW's "Health and Labour Sciences Research Grants," MAFF's "Basic Research Promotion Program for Creation of Innovation", METI's "Grant for Industrial Technology Research", and MOE's "Environment Research and Technology Development Fund."

(3) Reform of evaluation systems

In order to promote excellent, world-class R&D which contributes to both society and the economy, and the development of new science fields, it is effectively and efficiently, important to improve the R&D evaluation system.

All ministries and agencies conduct R&D evaluation using national budgets, based on their own detailed guidelines specifying evaluation methodologies that have been formulated in accordance with the National Guideline on the Method of Evaluation for Government R&D (Prime Minister decision of October 31, 2008). In December 2010, to follow up on the national guidelines, the Cabinet Office announced the outcomes of surveys on the progress of R&D evaluations conducted by each ministry. MEXT, which accounts for more than 60% of the government's total S&T-related expenses, set forth the Guideline for Evaluation of Research and Development in MEXT (Minister of MEXT decision) to be used as the basis by which the appropriateness of a budget request is judged by conducting preliminary evaluation which uses external evaluation. Then, interim evaluation is conducted to confirm the necessity of making changes to the plan, and post evaluation may also be necessary for application to the next deployment.

Meanwhile, independent administrative agencies and national universities conduct evaluation of their performance in accordance with the Act on General Rules for Independent Administrative Agency (Act No. 103 of 1999) and the National University Corporation Act (Act No. 112 of 2003), respectively. Ministries and agencies conduct policy evaluation in accordance with the Government Policy Evaluations Act (Act No. 86 of 2001).

Section 3 Reinforcing the Platform for the Promotion of Science and Technology

1 Strategic and Prioritized Improvement of Facilities and Equipments

(1) Improvement of facilities of national university corporations etc.

The facilities of national universities[1] play a vital role as centers of activities for creative and cutting-edge academic research, the development of creative and talented human resources, and promotion of the most advanced medical treatments.

Following the "Second Five-Year Program for Emergent Renovation and Building of Facilities of National Universities," decided in April, 2006, MEXT has been systematically and intensively promoting improvements of facilities, such as overhauling deteriorated facilities (including seismic retrofit), and

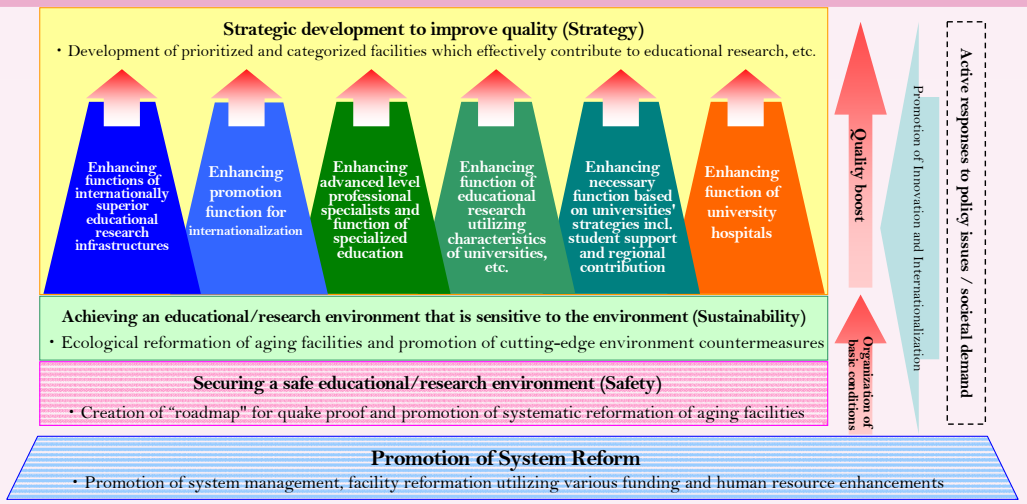
1 Inter-University Research Institute Corporation including Institute of National Colleges of Technology, Japan

addressing the other limitations of the facilities.

As a result, facilities of national universities have made some visible progress in improvements of deteriorated facilities and seismic retrofit. However, in the coming years, as other facilities continue to age, safety and functional issues of facilities continue to arise. In addition, universities and other relevant institutions are urged to respond to new policy issues and societal demands, such as further advancing and diversifying education and research activities, internationalizing higher education, and realizing education and research environments which reduce the environmental burden.

Pursuant to this goal, discussions have been underway at MEXT since December 2008, for drawing up the second five-year facility reform plan (for 2011-2015), by the "Research and Study Cooperators' Council Regarding Enhancement of Facilities for Future National University Corporations [literal translation]," composed of outside experts. According to the "Second Interim Report" in August, 2010, by going over promotion measures for focused facility improvements, and following the future vision of each university, and also for the purpose of improving the quality of the educational research environment at national universities, it is necessary to establish preeminent bases for educational research, to systematically and intensively improve facilities in order to secure new space for young researchers, and to improve the functional aspects of aging facilities. As basic conditions of such improvements, it is also necessary to promote efforts to ensure the safety of facilities (including earthquake-resistance measures), and to reduce the environmental load according the guidelines in the report. (Figure 2-3-15)

Figure 2-3-15/ Image of Prioritized Facility Development Promotion



(2) Improvement of facilities at national university corporations, etc.

In order to promote academic research, it is essential to improve facilities that form the platform for research activities. Old and outdated research facilities are an immediate problem for national university corporations, and the Council for Science and Technology (CST) has pointed out the need to execute planned maintenance work. In response, the national government, following a master plan for national university facilities, is supporting efficient and effective maintenance and improvements of research facilities In particular, in FY 2010, expenses were appropriated in the supplementary budget for the necessary funding for maintenance of basic research facilities under the premise of joint usage and

creating more advanced research facilities.

In addition, MEXT, in order to strategically and systematically promote a "Large-Scale Scientific Research Project"[1] which requires maintenance and enhancement of large-scale cutting-edge equipment, and while referring to examples of Europe and the U.S. at CST, drew up the "Roadmap," which included certain priority lists regarding research plans being prepared in researchers' communities. The Project such as "Large-scale Cryogenic Gravitational Wave Telescope Project" and "Exploring Physics Beyond Today's Particle Theory with the Super B-Factory"[2] were selected to be included in the "Leading-edge Research Infrastructure Program," implemented from 2010 [refer to (5) in this section], and support for all of these has been implemented.

(3) Improvement of facilities and equipment at private universities

It is critical for Japan to improve its research environment, such as facilities and equipment necessary for promoting advances in academic research. Expectations of the roles to be played by private universities, which make up about 80% of Japan's higher education, are growing with the great contributions these institutions make to the advancement of higher education in Japan by serving as a diverse source of researchers and actively engaging in unique research opportunities. In light of this situation, MEXT is working to enhance the platform of private universities' research by implementing the "Strategic Research Foundation Grant-aided Project for Private Universities," which provides comprehensive support to research facilities and equipments related to excellent research projects.

(4) Promotion of improvement and shared use of R&D facilities and equipment

The R&D facilities and equipment that serve as the basis for S&T promotion (referred to as "R&D facilities and equipment") are indispensable for the support of the full range of S&T activities from basic research to innovation creation. Therefore, it is necessary to improve and effectively utilize R&D facilities. "Act on Enhancement of Research and Development Capacity and Efficient Promotion, etc. of Research and Development, etc. by Advancement of Research and Development System Reform"[3] also specifies that the government should implement the necessary measures to promote the shared use of R&D facilities and equipment owned by independent administrative agencies, universities, and other organizations.

In this context, pursuant to the "Act on Promotion of Shared Use of Specified Large-Scale High Technology Research Facilities" (Act No. 78 of 1994) (hereinafter referred to as "Shared Use Act"), MEXT promotes shared use by researchers of industry, academia and the government through the support of necessary expenses for facility improvement and shared use of specified large-scale high technology research facilities (specifically, the next-generation supercomputer "K", radiation facilities [SPring-8, and X-ray Free Electron Laser-XFEL], and the Japan Proton Accelerator Research Complex [J-PARC]).

In addition, in order to promote the shared use of R&D facilities and equipment other than specified

1 This plan includes setting a laser interferometer with orthogonally intersecting 3km-long laser beams in the Kamioka Mine to detect gravity waves, and also constructing an international research base for gravitational wave astronomy whose research includes researching the moment of black hole formation. (Implementing organization: Inst. for Cosmic Ray Res., Univ. of Tokyo)

2 It aims at the following: 1) discovering and elucidating physical principles through the observation of very rare phenomenon that occurred only in the early universe by the use of a more advanced Asymmetric Electron-Positron Collider (KEKB), with a crash performance function of 40 times higher than its current performance, 2) elucidating the mystery that antimatter disappeared from the cosmic. (Implementing organization: High Energy Accelerator Research Organization, KEK)

3 The Act on Enhancement of Research and Development Capacity and Efficient Promotion, etc. of Research and Development, etc. by Advancement of Research and Development System Reform (Act No. 63 of 2008)

large-scale high technology research facilities, which are owned by other independent administrative agencies, universities, and other organizations, MEXT has been implementing "The Program for Strategic Use of Advanced Large-scale Research Facilities." In FY 2010, three facilities were newly adopted. Moreover, to supply basic information on utilization (location, utilization purposes, usable time, etc.) for promoting shared use of these facilities and equipment to generate results, MEXT opened its "Kyoyo Navi" (general navigation site for shared use of research facilities [literal translation]) as a web portal. (Figure 2-3-16)

Figure 2-3-16/ Agencies Implementing the "Program for Strategic Use of Advanced Large-scale Research Facilities"

(5) Developing research infrastructures where young researchers can be active

As a result of globalization and increasing international competition for top talents, the mobility of human resources has increased. With this in mind, it is necessary to increase the opportunities for Japanese researchers who have worked overseas to do well after they return home. It is also necessary to help prominent foreign researchers to be successful in Japan to realize international "brain circulation." Pursuant to these goals, from FY 2010, the "Leading-edge Research Infrastructure Program" was implemented in order to improve and enhance research infrastructures where advanced research results are to be developed, and to attract young researchers from both Japan and abroad.

2 Enhancement of the Intellectual Infrastructure

In order to promote research, development and related activities reliably and effectively, it is necessary to ensure the safety, reliability, and stable provision of materials, standards, techniques, equipment, and related elements factoring into the knowledge base (bioresources, etc.) which supports fundamental R&D

activities such as experimentation, measurement, analysis, and evaluation. For that purpose, the 3rd Basic Plan calls for prioritized efforts to achieve a world-class level in 2010.

MEXT has implemented the National BioResource Project (NBRP) and the Integrated Database Project to support research in the life sciences field. [See Part 2, Chapter 2, Section 2.1 (4).]

Cutting-edge measurement and analysis technology and instruments are part of a universal framework that allows for original, globally-advanced R&D results, and with such R&D endeavors being sufficiently advanced even on their own and many leading to the Nobel Prize awards, they are absolutely vital technology for progress in S&T. Because of this, the Japan Science and Technology Agency, in an effort to improve the country's R&D infrastructure, implemented the "Industry-Academia Innovation Acceleration Project 'Development of Systems and Technology for Advanced Measurement and Analysis,'" to promote the development of Japan's only one and number one best measurement and analysis technology and instruments, in order to respond to the needs of the world's top researchers.

Figure 2-3-17/Outcomes of Development of Systems and Technology for Advanced Measurement and Analysis

Left: High sensitivity and ultra-trace sampling system (equipment that is planned to be used for sample analysis of the asteroid, "ITOKAWA", brought by the asteroid explorer, the "HAYABUSA")
Right: High and constant pressure absorption measurement device (a device for assessing and analyzing storage material such as hydrogen in a short time)

Source: Japan Science and Technology Agency

MHLW established "master banks" at the National Institute of Biomedical Innovation (NIBIO), in order to collect and store the 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, the JHSF obtained the cooperation of medical institutions to collect human tissue for research use, by giving careful consideration to bioethical issues, and commenced activities to distribute the tissues to researchers on request.

At METI, the Special Committee on Measurement Standards and Intellectual Infrastructure, a joint body composed of the Industrial Technology Subcommittee of the Industrial Structure Council and the Japanese Industrial Standards Committee (JISC), set six major areas as intellectual foundation overhaul

targets: 1) Measurement standards, 2) Geological information, 3) Chemical safety management, 4) Lifestyles and safety, 5) Biological genetic resource information, and 6) Materials, and have been making efforts to enhance each area. The National Metrology Institute of Japan (NMIJ) of the AIST took a leading role to enhance measurement standards, revising 302 physical standards and 313 standard substances, which greatly exceeded previous target values, to bring them on par with American and European measurement standards.

In relation to the genetic resource information infrastructure, the National Institute of Technology and Evaluation (NITE) collects, preserves, and distributes information, while integrating the databases of major genetic resources in Japan to be released to the public. In addition, NITE is actively working on the development of genetic resources in Asia, including the "Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM)" and joint microbial search with Asian countries. [Refer to Part 2, Chapter 2, Section 2, 1 (4)] Furthermore, AIST is updating databases of human genetic and protein information and the genetic database concerning carbohydrate chains to develop a life science database by integrating these separate sources. MAFF collects, preserves, and provides genetic resources related to the industries of agriculture, forestry, and fisheries as part of the Genebank project, while organizing the "Agriculture, Forestry and Fisheries-related Genomic Information Integrated Database." [Refer to Part 2, Chapter 2, Section 2, 1 (4)]

In terms of chemical safety management infrastructure, the ministry collects and coordinates data on hazardous chemical substances, and also develops simplified testing methods to evaluate the chemical safety accurately.

For development of infrastructure for life and safety, NITE releases data related to basic human characteristics that contribute to safe and user-friendly designs of products and develops evaluation methods concerning functions and performance of welfare equipment.

Regarding geological surveys, AIST produced five geological sheet maps in FY 2010. In addition, the Institute integrated the pre-existing database of domestic and international geological literature publications in relation to geological information, and has released the "Geological Literature Search System (GEOLIS)," a searchable geographical information system. The Research Information Database (RIO-DB) was revised to include adjustments to new standards, more efficient use of geological information, indications of disaster cases, and an expanded support policy for product creation. The Institute has also improved and updated various other databases such as the "Integrated Spectral Data Base System" and the "Dispersion Thermophysical-property Database."

MLIT has organized and provided "Map Information Infrastructure[1]" which is a core of "Basic Plan for the Advancement of Utilizing Geospatial Information [literal translation]." Also, MLIT has been conducting survey and research on use of geospatial information.

Table 2-3-18 shows the status for the development of facilities to preserve and provide intellectual infrastructure by the ministries and agencies.

1 Criteria for defining locations of geo-spatial information on digital maps.

Table 2-3-18/ The State of Development of Intellectual Infrastructures

Ministry	FY developed	Name of facility	Intellectual infrastructures
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	Shared Information of Genetic Resources
	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
	2005	Tsukuba Primate Research Center, National Institute of Biomedical Innovation	Primates
	2005	National Institute of Biomedical Innovation	Genes (bank)
	2006	National Institute of Biomedical Innovation	Cells (bank)
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 Ministry of Economy, Trade and Industry	Rice mutant lines, cDNA, etc.	National Institute of Advanced Industrial Science and Technology, Geological Survey of Japan	Geological data (about 100% of all 124 geological maps of the country at a scale of 1:200,000, and 947, about 74%, of all 1,274 geological maps at a scale of 1: 50,000)
	1882	National Institute of Advanced Industrial Science and Technology, National Metrology Institute of Japan	National measurement standards (280 physical standards, 290 reference materials)
	1903	National Institute of Technology and Evaluation, Department of Biotechnology	Genetic resources, including effective microorganisms, their DNA information, DNA clones, etc. (about 65,000 microorganisms, about 73,000 DNA clones)
	1993	National Institute of Technology and Evaluation, Chemical Management Center	Comprehensive chemical management information on about 5,600 substances
Ministry of Land, Infrastructure, Transport and Tourism	1996	Port and Airport Research Institute	Information concerning waves and tsunamis observed along Japanese coasts through a nationwide port and ocean wave information network
	1970	Port and Airport Research Institute	Information concerning strong earthquakes in coastal areas
Ministry of the Environment	1983	National Institute for Environmental Studies	Environmental microorganism strains and endangered algae (about 2,200 strains)