Chapter 1 Development of Science and Technology Policy

1 The Science and Technology Basic Plan

The Third Science and Technology Basic Plan (Cabinet decision: March 2006) prescribes basic and comprehensive measures for promoting science and technology in Japan for the period from FY 2006 to FY 2010 based on the Science and Technology Basic Law (Law No. 130, effective on November 15, 1995).

Science and technology is the platform that supports the economy of Japan, and its role is increasingly expanding in recent years to overcome the global problems of an aging population combined with a decreasing birth rate, issues of safety and security, and the environment. During the five-year period of the Plan for responding to such expectations by utilizing investments in science and technology (S&T) accumulated in the past, it is essential to develop human resources and a competitive environment capable of producing high quality research outcomes, invest strategically in the development of science and the creation of persistent innovation, and eliminate the systematic and operational bottlenecks to disseminate the results to society.

For this purpose, the Plan designates the two basic positions of S&T supported by the public to benefit society and an emphasis on fostering human resources and competitive research environments—the shift of emphasis from hard to soft, such as human resources, the greater significance of individuals at institutions, and defines the six major objective goals targeted by S&T policies. In order to achieve these, the Plan conducts prioritization in the respective fields by emphasizing basic research and selecting strategically prioritized S&Ts.

Furthermore, the Plan stipulates the target of maintaining the ratio of government research and development (R&D) investments to GDP at the level of the US and major European countries during its five-year period. Specifically, a total of about 25 trillion yen in government R&D investments is required during the same timeframe (based on the presumption that government R&D investments will be 1% of GDP, with a nominal GDP growth rate of 3.1%) (Figure 2-1-1).

With regard the budgetary process for each fiscal year, it has been decided to retain the expenses necessary for the promotion of measures described in the Plan with the aim of maximizing the effect of government investments by considering the social and economic trends of the future and by steadily implementing S&T system reform under the status of budget constraints.

Figure 2-1-1 Outline of the Third Science and Technology Basic Plan (FY 2006-2010)

Basic Ideas

○Basic stances

1. S&T to be supported by society and the public, and to disseminate results to society
   Continuously enhancing the scientific level ⇒ Creating intellectual and cultural values
   Dissemination R&D results to society and the public through the creation of innovation ⇒ Creating social and economic values
2. Emphasis on fostering human resources and competitive research environment

○Clarification of the goals of S&T policies

Setting practical policy goals that should be achieved through the three Ideas in order to clearly explain the aims of governmental R&D investments

Major goals: I Discovering and inventing significant knowledge ii. Breakthroughs in S&T delimitation
iii Environmental protection and economic growth iv. Innovator Japan
v. Vigorous life throughout the lifetime vi. The country being proud of safety

○ Government R&D Investment

The total amount of the governmental R&D investment: About 25 trillion yen (Based on the assumption of 1% versus GDP, the nominal GDP growth rate with 3.1% during the Plan.)

Strategic Priority Setting in S&T

○Promotion of basic research

Research driven by the free ideas of researchers → Promoting a variety of research activities from the very early stages
*Clearly demarcating from agenda-oriented research. Address "big sciences" through appropriate judgment including its order of priority.
Basic research that aims at future application based on policies → Creating knowledge that will become a wellspring of discontinuous innovations

○Prioritization in agenda-oriented S&T

Four priority fields to be promoted (life sciences, information, and telecommunications, environmental sciences, and nanotechnology/materials) and four fields to be promoted (energy, manufacturing technology, infrastructure, and frontier)

Sectoral promotion strategy

- Selection of strategic prioritized S&T where funds will be allocated preferentially during the Plan
  i. Social and public concerns or needs (safety and security), ii. international S&T competition, and iii. national critical technology (supercomputer, space transportation system, etc.)
- Handling emerging/interdisciplinary fields
- Flexibly amending/revising sectoral promotion strategy during the Plan when needed. (Realization of "practical strategies")

S&T System Reform

1. Developing, securing, and activating human resources

○Creating an environment making the most of each characteristics
- Supporting independence of young researchers
- Promoting activities of female and overseas researchers

○Enhancing the function of human resource development at universities
(Platform for the promotion of graduate school education and support for doctorate course students)

○Developing human resources that meet societal needs

○Expanding the horizons of human resources for the next generation's S&T

2. Sustainable development and creation of persistent innovation

○ Developing a competitive environment

○ Enhancing the competitive edge of universities
(Creating thirty top world-class research centers, regeneration program for local knowledge centers, and utilize private universities)

○ Enhancing systems creating innovation
(Systems aims to create innovation, bases for advanced interdisciplinary research, and mechanism that link research results to practical application)

○ Building regional innovation systems and creating vital regions

○Effective and efficient promotion of R&D
(Establishing database for overlap between funding systems)

○Elimination of institutional/operational bottlenecks for smooth S&T activities and dissemination of its results to society

3. Reinforcing the foundation for promoting S&T

○ Fostering excellent human resources and reinforcing research/education bases supporting their activities
(Promotion of "Second Five-Year Program for Emergent Renovation and Building of Facilities of National Universities, etc.)

○ Promoting development and shared use of advanced large-scale public research facilities

○ Improving intellectual infrastructure

○ Creating, protecting, and utilizing intellectual property

○ Promoting R&D in public research institutions

○Improving research information infrastructure and promoting activities of academic societies

4. Strategically promoting international activities

○ Systematic efforts towards international activities

○ Cooperation with Asian countries

○ Improving the environment for reinforcing international activities and promoting acceptance of talented overseas researchers

S&T to be supported by society and the public

○ Responsible measures to be taken to resolve ethical, legal, or social issues caused by S&T
(incl. making rules against fabrication of data in research)

○ Enhancing accountability and S&T information dissemination

○ Improving public awareness towards S&T

○ Promoting proactive participation towards S&T

Role of CSTP

○ Strengthening the function as a headquarters
- **Effective and efficient promotion of governmental R&D**
  (incl. reinforcement of awareness towards S&T activities by corporations and collating of their views)
- **Elimination of institutional/operational bottlenecks**

2 The Council for Science and Technology Policy

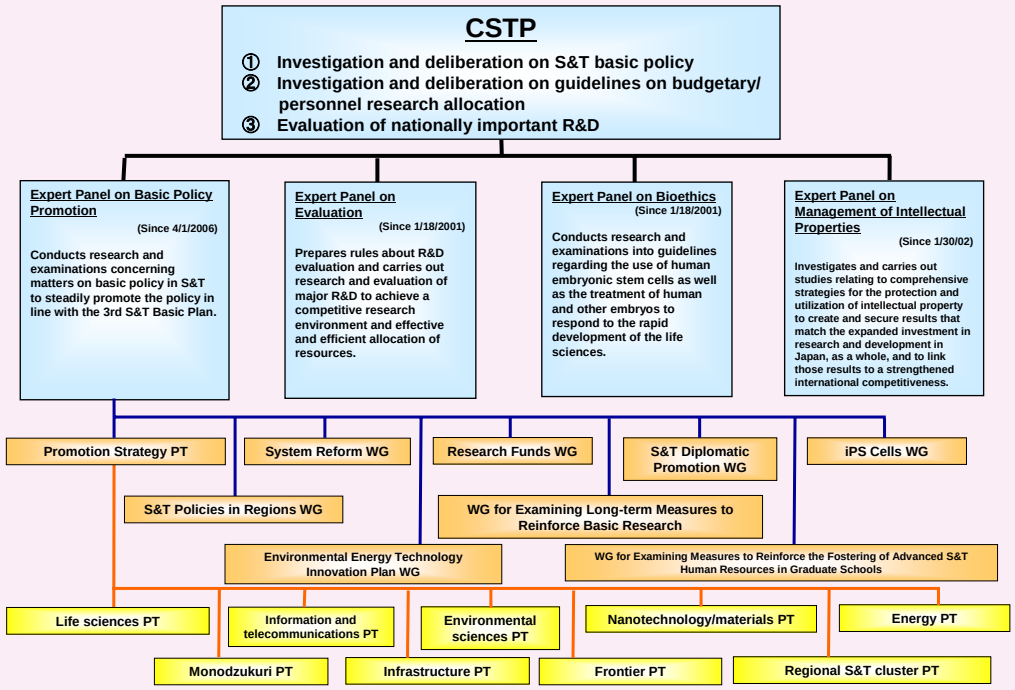
The Council for Science and Technology Policy (CSTP) is the headquarters for Japan's strong promotion of S&T policies under the leadership of the Prime Minister. CSTP was established under the Cabinet Office as a Policy Council on Key Policy Fields together with the Council on Economic and Fiscal Policy at the reorganization of government ministries and agencies in January 2001. Overseeing all of the nation's S&T, CSTP formulates and coordinates both comprehensive and basic policies. As a general rule, the Council, chaired by the Prime Minister, includes relevant cabinet and executive members (Figure 2-1-2).

In addition, under the Council, four expert panels, including the Expert Panel on Basic Policy Promotion, were established as of March 2009 to discuss technical items related to important matters (Figure 2-1-3).

Table 2-1-2 CSTP Membership Roster (As of April 1st, 2009)

Cabinet Members	Taro Aso	Prime Minister
	Takeo Kawamura	Chief Cabinet Secretary
	Seiko Noda	Minister of State for Science, Technology and Innovation Policy
	Kunio Hatoyama	Minister of Internal Affairs and Communications
	Kaoru Yosano	Minister of Finance
	Ryu Shionoya	Minister of Education, Culture, Sports, Science, and Technology
	Toshihiro Nikai	Minister of Economy Trade, and Industry
Executive Members	Masuo Aizawa	Former President, Tokyo Institute of Technology
	Tasuku Honjo	Visiting Professor, Kyoto University
	Naoki Okumura	Former Representative Director and Executive Vice President, Nippon Steel Corporation, Ltd
	Takashi Shiraishi	Professor, vice-predsident, National Graduate Institute for Policy Studies
	Sadayuki Sakakibara	President, Toray Industries, Inc.
	Toyoko Imae	Professor emeritus, Nagoya University
	Reiko Aoki	Professor, Institute of Economic Research, Hitotubashi University
	Ichiro Kanazawa	President, Science Council of Japan

Figure 2-1-3 CSTP Organizational Chart



1 Major Measures Implemented by CSTP in FY 2008

(1) Strategy for Innovative Technology

CSTP defined the Strategy for Innovative Technology (decision/supplementary recommendation: May 2008) to continuously create unrivaled technologies that enable us to achieve sustainable economic growth and build an affluent society. Based on this strategy, CSTP implemented following measures as follows: a) the Innovative Technology Promotion Fund was created to accelerate R&D by investing flexibly in response to situational changes. The technologies that should be accelerated as soon as possible will be selected from the innovative technologies, based on innovative technology promotion advisers' opinions, and b) the "Big Challenge Research Scheme" was set up to promote out-of-box, innovative, and challenging research (so-called high-risk, high-return basic research), and allotted funds to the Grants-in-Aid for Scientific Research in FY 2009.

(2) The Environmental Energy Technology Innovation Plan

The Environmental Energy Technology Innovation Plan (decision/supplementary recommendation: May 2008) was formulated as a technological strategy to achieve the long-term goal of reducing greenhouse gas emissions throughout the world by at least by 50% by the year 2050 while achieving energy security, a balance of environmental preservation and economic development, and contributions to the developing countries.

(3) Strengthening S&T diplomacy

Toward the Reinforcement of Science and Technology Diplomacy (decision/supplementary

recommendation: May 2008) was formulated to integrate and develop Japanese S&T and diplomacy.

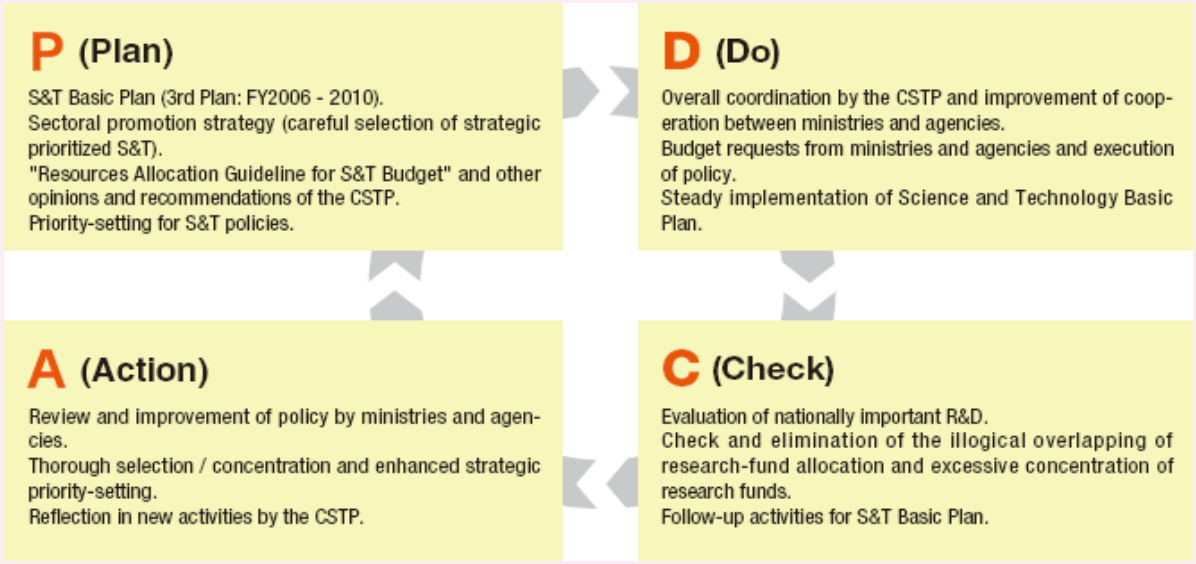
(4) Regional revitalization through S&T

Based on the current regional S&T policies, CSTP formulated the Strategy for Regional Revitalization through S&T (decision/supplementary recommendation: May 2008) to actively promote the creation of innovation in regions. This strategy aims at establishing a group of diverse regional and global S&T bases, forming a strong and dynamic eco-system among these bases and allowing them to compete and cooperate.

2 Setting Strategic Priorities and Comprehensive Promotion of S&T Measures

CSTP intends to improve the quality of S&T measures through the PDCA cycle, as well as by enhancing its effort to further improve the S&T budget to enhance Japan's S&T competitiveness. As the Plan entered its 4th year in FY 2009, the Council started efforts to set strategic priorities by selection and concentration based on past achievements to ensure that truly important R&D is steadily implemented, and that the achievements of such R&D will be broadly disseminated to society (Figure 2-1-4).

Figure 2-1-4 Conceptual Diagram of PDCA Cycle to Improve S&T Budget



(1) Overview and Resource Allocation Guidelines for the S&T Budget in FY 2009 (Decision/supplementary recommendation: June 19, 2008)

Based on the Plan and the promotion strategy, the Overview and Resource Allocation Guidelines for the S&T Budget in FY 2009, which clarifies the issues to be addressed in FY 2009, was decided, and opinions were offered to the Prime Minister and relevant ministers.

The guidelines refer to innovative technologies, environmental energy technologies, S&T diplomacy,

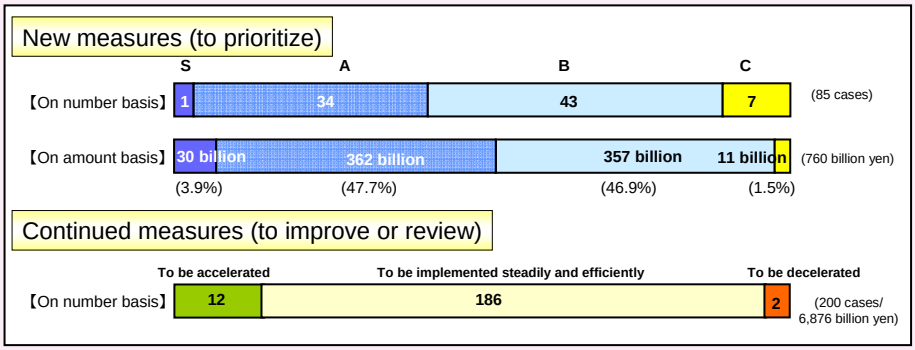
regional revitalization through S&T, and the Pioneering Projects for Accelerating Social Return as the most important issues to be selectively executed in FY 2009. This requires that the individual ministries, agencies and R&D corporations exert efforts to implement the aforementioned in addition to the strategically prioritized S&T.

(2) Prioritization of S&T measures (October 2008)

In order to concentrate on truly important measures for the allocation of resources, priorities were established based on the aforementioned guidelines as well as interviews, detailed checks, and advice from external experts for S&T measures that individual ministries and agencies had made budget requests for. As a result of this careful process, Promotion of Prioritization of S&T Measures in the FY 2009 Budget Requests [literal translation] was compiled.

In relation to S&T budget request in FY2009, checks and proposals were made on the prioritization by each organization. Individual measures were prioritized and 74 % (on the event basis) of the new measures designated S- or A-rank were selected as the most important issues (Figure 2-1-5).

Figure 2-1-5 Prioritization Outline of S&T Measures in FY 2009 Budget Requests



(3) Clarification of S&T activities conducted by independent administrative institutions and national universities, and the publication of opinions offered regarding the activities (October 2008)

Although independent administrative institutions and national university corporations engaged in S&T activities are funded through government subsidies, it is difficult to understand the use, services implemented, and the allocated amount of grants at the budgetary process. From the perspective of ensuring appropriate implementation of the Plan, a survey was conducted on various indicators that can be regarded as outputs from institutions and corporations. Based on the results of the survey, the CSTP executive members summarized their findings on items for which progress was evident and items that were judged to need a further enhancement of efforts.

(4) S&T budgetary process (Decision/supplementary recommendation: December 8, 2008)

CSTP determined the items to be prioritized and noted in the budgetary process so as to

sufficiently ensure the S&T budget based on the prioritization results, and its opinions were offered to the Prime Minister and the relevant ministers.

(5) R&D evaluations

1) Prior evaluations of nationally important R&D projects (Decision/notice: December 8, 2008)

Prior evaluations of large, nationally important R&D development projects to be implemented in FY 2009 with more than 30 billion yen provided by the government, including the Ministry of Economy, Trade and Industry (METI)'s Verification Test of CO_2 Reduction Technology for Climate Change Problems [literal translation], were carried out, and the minister of METI was notified of the results.

2) Follow-up on prior evaluations of nationally important R&D projects (September 2008)

Prior evaluations were implemented in FY 2006 for the Targeted Proteins Research Program (MEXT) and the Field Test Project for Solar Energy System [literal translation] (METI). The Expert Panel on Evaluation checked the respective ministries' actions in response to the evaluation results and notified them of the improvements in FY 2008.

3) Post-project evaluation of nationally important R&D projects

CSTP prepared a follow-up evaluation on the Research on Functional Analysis of the Rice Genome [literal translation] (MAFF), for which a prior evaluation was completed in FY 2007.

3 Major Items Discussed at Expert Panels

(1) Expert Panel on Basic Policy Promotion

The Panel, established in April 2006 to steadily promote the Third Science and Technology Basic Plan, conducted a survey on the reform of various S&T systems as well as on the competitive funding system, and initiated a follow-up of the Plan in March 2009.

WG for Examining Long-term Measures to Reinforce Basic Research [literal translation] was established in FY 2008 to plan out new long-term measures for reinforcing basic research. Moreover, WG for Examining Measures to Reinforce the Fostering of Advanced S&T Human Resources in Graduate Schools [literal translation] was established to foster advanced human resources who can survive international competition.

The Sectoral Promotion Strategy Project Team established under the Panel implemented the following efforts:

1) Follow-up of Sectoral Promotion Strategy

As for the implementation of the Promotion Strategy (CSTP decision: March 2006), follow-up is implemented every year by the respective PTs for each of the four priority fields to be promoted (life sciences, information and telecommunications, environmental sciences, and nanotechnology/materials) and the four fields to be promoted (energy, manufacturing technology, infrastructure, and frontier). The FY 2007 follow-up results were wrapped up in June 2008.

2) Promotion of the Coordination Program of S&T Projects

The Coordination Program of S&T Projects is designed to maximize the effects of the related measures by excluding duplication of measures implemented by respective ministries and agencies and strengthening coordination.

From FY 2005, eight topics (1) Basic Research and Infrastructure for Life Sciences; (2) Emerging, Reemerging Infectious Diseases; (3) Ubiquitous Networks; (4) Next Generation Robots; (5) Biomass Utilization Technologies; (6) Hydrogen & Fuel Cell; (7) Nanobiotechnology; and (8) Regional Science & Technology Cluster) have been initiated. In FY 2007, six topics (9) Clinical and Translational Research; (10) Food and Biological Production Research; (11) Very Large Information Integration and Application Platform; (12) Integrated Chemical Risk Management; (13) Developing Nanotechnologies and Engaging the Public; and (14) Research and Development for Counterterrorism are selected and implemented. Completed topics are being wrapped up.

(2) Expert Panel on Evaluation

The Panel wrapped up evaluation drafts of the nationally important R&D projects to be initiated in FY 2009, and the follow-up of prior evaluations of nationally important R&D projects implemented in FY 2006 were carried out. In addition, the revision of the National Guideline on the Method of Evaluation for Government R&D was discussed and a draft was created to promote the evaluation system reform.

(3) Expert Panel on Bioethics

The Panel aims to conduct surveys and discuss bioethics in order to cope with ethical problems deriving from the development of bioscience, such as research in brain science and research on the clinical application of human embryos. The Panel asked MEXT to review the Guidelines for Derivation and Utilization of Human Embryonic Stem Cells in FY 2008. In addition, the revision of the guidelines for research on cloned embryo, about which CSTP was consulted, is discussed for recommendations.

(4) Expert Panel on the Management of Intellectual Properties

The Panel has compiled On the Intellectual Property Strategy every year since 2002, which focuses on the promotion of intellectual property activities at universities.

In 2008, the Panel reviewed its intellectual property strategy considering innovative technologies including open innovation and iPS cells, which are among the S&T trends closely related to intellectual properties, and finalized the Intellectual Property Strategy with 49 recommendations. Included is the recommendation that appropriate protection of intellectual property in advanced medicine should be discussed and concluded immediately. The Panel offered their recommendations to the relevant ministers in May 2008.

In addition, the Panel follows up on the organization of systems for cooperation and sharing among them for the smooth implementation of such measures as construction of an integrated database for research tool patents in the life sciences [literal translation], which are described in the Strategy and require such cooperation.

3 S&T Administrative Structure and Budget

1 S&T Administrative Structure

The Science and Technology Basic Law requires the government to assume responsibility for formulating and implementing comprehensive measures in relation to the promotion of S&T and to formulate the Science and Technology Basic Plan.

Within the administrative organization, CSTP is established under the Cabinet Office, which is in charge of planning key policies of the government and overall coordination. CSTP summarizes various reports on the comprehensive strategy for the promotion of S&T and policies for the allocation of resources, such as budgets and human resources. Based on these reports and the authority of each relevant administrative agency, they promote and conduct research under the various systems, and develop R&D environments at national experiment and research institutions, independent administrative institutions, universities, and inter-university research institutes.

MEXT prepares specific R&D plans for individual sectors and coordinates the management of S&T with the relevant administrative institutions through such work as the allocation of the Special Coordination Funds for Promoting Science and Technology. In addition, MEXT comprehensively promotes the implementation of R&D in advanced and important S&T fields and the administration of S&T that advances and strengthens creative and basic research. The Council for Science and Technology (CST) is established under MEXT to survey and discuss important matters in relation to the comprehensive or academic promotion of S&T based on a consultation from the Minister of MEXT, and to offer its own opinions to the Minister. The CST's main proposals are shown in Table 2-1-6.

In recent years, inter-ministerial liaison committees for various research sectors and related measures are being established, promoting information exchange concerning the progress of research, etc., and researcher exchanges.

In addition, the Science Council of Japan (SCJ), consisting of 210 regular and some 2,000 associate members, is established under the jurisdiction of the Prime Minister as the representative body for the community of scientists in Japan. SCJ is engaged in such activities as suggesting policies in relation to science, discussing important issues, cooperating with the community of scientists, cooperation with international academic organizations, and raising public awareness about the roles of science (Table 2-1-7).

Table 2-1-6 Proposals of the Council for Science and Technology (FY 2008)

1. Proposals
   a) Promotion of the observation & research plan for prediction of earthquakes and volcanic eruptions (proposed on July 17, 2008)
   b) Revision of Guidelines for R&D evaluation in MEXT (proposed on Jan. 23, 2009)

2. Reports

Date (m/d/y)	Reports
	Subdivision on R&D Planning and Evaluation
8/12/08	FY 2009 enforcement policy for earth observation in Japan
8/29/08	Promotional measures for R&D in relation to global environmental S&T
	Subdivision on Science
5/27/08	Wrap-up report on discussions on the promotional system for academic research: Promotion of public utilization and joint research among national, public, and private universities
7/7/07	Report on the promotion of academic research on the Japanese language
7/16/08	Direction of measures to be taken on Grants-in-Aid for Scientific Research (Wrap-up of Deliberations (Part 2), Subcommittee on Research Expenses)
1/8/09	Recommendation on basic research and research based on the researchers' free ideas
1/20/09	Report on the promotion of humanities and social sciences: A way to the formulation of cultural framework based on dialogues and substantiations
	International Committee
6/30/09	Strategic promotion of collaboration with European countries in S&T fields

Table 2-1-7 President and Vice-Presidents of the Science Council of Japan (21st Term)

President: Ichiro Kanazawa
Vice-president (organizational management): Sinichiro Ohgaki
Vice-president (contact with the government): Kotaro Suzumura
Vice-president (international activities): Hideaki Karaki

2 S&T Budget

The FY 2008 S&T budget totals 3,570.8 billion yen. Of this total, the general account budget is 3,039.8 billion yen; the special account budget is 531.0 billion yen. In the general account budget, the amount earmarked for the promotion of S&T is 1,362.8 billion yen (Table 2-1-8).

The Ministry and agency S&T budget trends are shown in Table 2-1-9.

Since the administration of S&T in Japan is spread among a large number of ministries and agencies, there is a need for coordination to eliminate unnecessary duplication of measures and promote stronger cooperation, so as to ensure overall consistency, as well as to efficiently and effectively promote S&T.

For this reason, MEXT collects information from the relevant ministries and agencies prior to S&T budget requests to eliminate any duplication of requests and to promote inter-ministerial cooperation.

Table 2-1-8 Trends in S&T Expenditures

(100 million yen)

Item \ FY		FY2003	FY2004	FY2005	FY2006	FY2007	FY2008
	Funds for promoting S&T (A)	12,298	12,841	13,170	13,312	13,477	13,628
	Percentage increase over the previous year %	103.9	104.4	102.6	101.1	101.2	101.1
	Other research appropriations (B)：	6,554	16,823	16,345	16,667	16,428	16,770
	Percentage increase over the previous year %	97.9	256.7	97.2	102.0	98.6	102.1
S&T budget in general accounts (C)＝(A)＋(B)		18,852	29,664	29,515	29,979	29,905	30,398
Percentage increase over the previous		101.7	157.4	99.5	101.6	99.8	101.6
S&T budget in special accounts (D)		17,122	6,419	6,264	5,764	5,208	5,310
Percentage increase over the previous		101.2	37.5	97.6	92.0	90.4	102.0
S&T budget (E)＝(C)＋(D)		35,974	36,084	35,779	35,743	35,113	35,708
Percentage increase over the previous		101.5	100.3	99.2	100.1	98.2	101.7
General account budget (F)		817,891	821,109	821,829	796,860	829,088	830,613
Percentage increase over the previous		100.7	100.4	100.1	97.0	104.0	100.2
General budget expenditure (G)		475,922	476,320	472,829	463,660	469,784	472,845
Percentage increase over the previous		100.1	100.1	99.3	98.1	101.3	100.7

Table 2-1-9 S&T Expenditures Breakdown, by Ministry/Agency

(Million yen)

Items / Ministry or agency	FY 2007				FY 2008			
	Funds for promoting S&T	Other research appropriations from general account budget	S&T budget in special accounts	Total amount of S&T Budget	Funds for promoting S&T	Other research appropriations from general account budget	S&T budget in special accounts	Total amount of S&T Budget
Diet	1,067	47	–	1,114	1,108	47	–	1,155
CAS	–	60,312	–	60,312	–	63,774	–	63,774
CAO	12,603	3,619	–	16,222	14,520	3,621	–	18,141
NPA	2,117	48	–	2,165	2,141	307	–	2,448
MIAC	53,388	13,209	6,500	73,097	49,243	17,391	4,200	70,834
MOJ	–	2,011	–	2,011	–	6,327	–	6,327
MOFA	–	11,515	–	11,515	–	11,934	–	11,934
MOF	1,222	319	–	1,541	1,171	333	–	1,504
MEXT	855,012	1,308,782	148,330	2,312,124	861,864	1,308,948	147,407	2,318,218
MHLW	111,763	1,451	18,315	131,529	113,530	1,439	21,455	136,424
MAFF	118,704	9,123	1,200	129,027	118,704	11,481	1,400	131,585
METI	146,150	46,697	310,478	503,325	147,696	42,889	322,128	512,714
MLIT	24,392	24,897	29,429	78,538	31,769	20,703	26,103	78,575
MOE	21,281	3,454	6,712	31,447	21,033	3,717	8,327	33,076
MOD	–	157,290	–	157,290	–	184,088	–	184,088
Total	**1,347,699**	**1,642,774**	**520,785**	**3,511,258**	**1,362,778**	**1,676,999**	**531,020**	**3,570,796**

Notes:

1. All amounts refer to initial expenditures or appropriations for the respective fiscal year.
2. The figures in the total column may differ from the sum of the amounts for each column due to round-off.
3. There are cases when some figures are doubled up, except for the figures in the total column.