

Chapter 5 Establishing a Systemic Virtuous Cycle of Human Resources, Knowledge and Capital for Innovation

Making the most of domestic and international intellectual resources, we will foster and take advantage of “new value.” To this end, we will develop an innovation creation system by circulating human resources, knowledge and funds beyond organizations, sectors and borders to fully bring out their respective abilities, by fostering strong, deep collaboration among private businesses, universities and public research institutions and by strengthening establishment of startups. This will strengthen the international competitiveness of the whole country and accelerate economic growth.

Section 1 Enhancing Mechanisms for Promoting Open-innovation

Innovations are realized mostly by private businesses. However, collaboration with universities and public research institutions as well as more flexible business partnerships are important to accelerate commercialization. In order to promote open innovation globally, it is important to develop a system for cooperation and co-creation where partners can use their respective strengths and complement each other. It is also important to increase the mobility of human resources, knowledge and funds to create an environment that facilitates innovations.

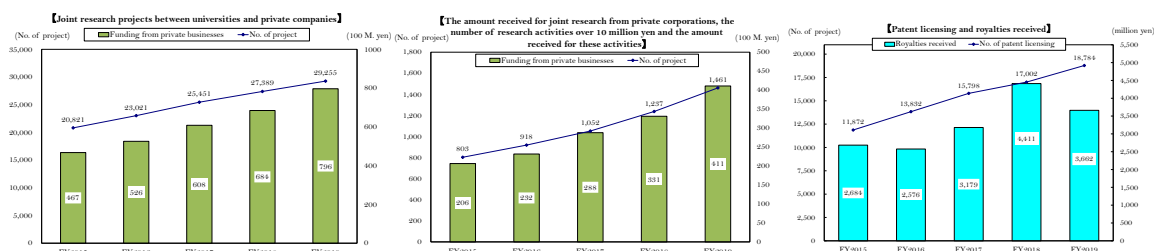
① Enhancing systems of promotion in companies, universities, and public research institutes

(1) Current status of domestic and international industry-academia collaborative activities

A. Status of industry-academia-government collaboration at universities

Since the corporatization of national universities in April 2004, industry-academia-government collaboration activities have been increasing. In FY 2019, the number of collaborative research activities between universities and private corporations was 29,255 (a 6.8% increase over the previous year) and the amount received for joint research from private corporations was about 79.6 billion yen (a 16.4% increase over the previous year). Among them the number of collaborative research activities over 10 million yen was 1,461, the amount received for this research was about 41.1 billion yen and the number of licensed patents reached 18,784. These numbers also steadily increased from the previous fiscal year (Figure 2-5-1).

■ Figure 2-5-1/Transition in achievements of joint research at universities ■



- Notes: 1. Subjects: national, public and private universities
 2. The term "Universities" indicates universities, junior colleges, technical colleges and inter-university research institutes
 3. The number of patent licensing denotes the number of patents that have been licensed or transferred (including patents pending)

Source: Implementation Status of Industry-Academia-Government Collaborations at Universities (2019), MEXT (as of January 29, 2021)

B. Activities of the Technology Licensing Organization (TLO)

As of January 1, 2021, 34 TLOs had been approved by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Economy, Trade and Industry (METI) under the Act on the Promotion of Technology Transfer from Universities to Private Business Operators (Act No. 52 of 1998).

In this regard, also as a response to the 4th industrial revolution in recent years, further promoting a return of research results at universities to society will contribute to the improvement of industrial technology and the development of new business fields. For this purpose MEXT launched the "Program to Support Formation of Innovation Management Hub" in FY2019 and has been promoting environmental improvement contributing to effective utilization of intellectual property and formation of joint research at universities through strengthening the networks between universities, industry and TLO.

(2) Development of industry-academia-government collaboration systems at universities

With regard to industry-academia-government collaboration systems for joint research by Japanese universities and National R&D Agencies with foreign enterprises, the government commenced studies on guidelines for collaboration with foreign enterprises while considering security trade control.

The Government sets a goal to strengthen the industry-academia-government collaboration systems and triple the investment from private businesses to universities and National Research and Development (R&D) Agencies over the next 10 years. To this purpose, at the Council of Industry-Academia-Government Dialogues for the Promotion of Innovation that was held jointly with METI, MEXT formulated the Guidelines for Fortifying Joint Research Through Industry-Academia-Government Collaboration in November 2016, compiling the challenges for universities and National R&D Agencies in strengthening industry-academia-government collaboration and directions for the challenges from the industry perspective. While working to spread the guidelines, MEXT compiled an addendum edition in June 2020 for improvement of the effectiveness of the guidelines by systematizing directions to eliminate bottlenecks in universities, etc. and new challenges and prescriptions for industries/enterprises. In FY2018 the

ministry started “the development of the Open Innovation System” to encourage private investment by promoting large-scale joint research through the development of a system for centralized management of large-scale research that is deeply involved with corporate business strategies (with focus on competing areas).

Further in July 2019, the ministry jointly with Japan Business Federation and METI published the “University Fact Book 2019” to advance “visualization of universities’ efforts for industry-academia-government collaboration. In July 2020, “University Fact Book 2020” was compiled with updated contents based on the latest data.

Under the Industry-Academia Collaborative Support Project, the Ministry of Agriculture, Forestry and Fisheries (MAFF) has allocated industry-academia collaboration coordinators (experts in agriculture, forestry and fisheries and in the food industry) around the country to capture needs, collect and provide research seeds, support industry-academia-government matching, introduce and support R&D funding, and support commercialization.

(3) Enhancement of R&D through industry-academia-government collaboration

The Japan Science and Technology Agency (JST) is conducting the following programs: 1) the Adaptable & Seamless Technology Transfer Program through Target-Driven R&D (A-STEP), which provides hands-on support for the entire process from the exploration of diverse technological seeds and search for enterprises by researchers who have results of state-of-the-art fundamental research up to technology transfer to enterprises through promotion of construction of core technologies and development for practical application; 2) the Strategic Promotion of Innovative R&D (S-INNOVATION), which supports R&D carried out under the themes selected from excellent research outputs in academia with the aim of creating technological foundations of new industries and; 3) Collaborative Research Based on Industrial Demand, which supports basic research in academia that could resolve technical challenges commonly seen in industry in an effort to promote practical application of university research outputs. MEXT is also implementing the Newly extended TEchnology transfer Program (NexTEP) using national funds, etc. to support private corporations that are working on large-scale practical application of university research outputs whose application involves development risks.

Under “the Public-Private Program to Discover and Support Young Researchers” that has been implemented by the New Energy and Industrial Technology Development Organization (NEDO) since FY2020, METI supports matching of young university researchers, etc. aspiring to achieve commercialization with suitable enterprises, while subsidizing joint research with enterprises with the aim of tripling the support for young researchers and private investments in universities.

The Ministry of Internal affairs and Communication (MIC) is promoting technological and social demonstrations of IoT and a new generation network in industry-academia-government partnership using

the NICT comprehensive test bed that has been developed and managed by the National Institute of Information and Communications Technology (NICT).

(4) Preferential treatment to promote R&D investment by the private sector

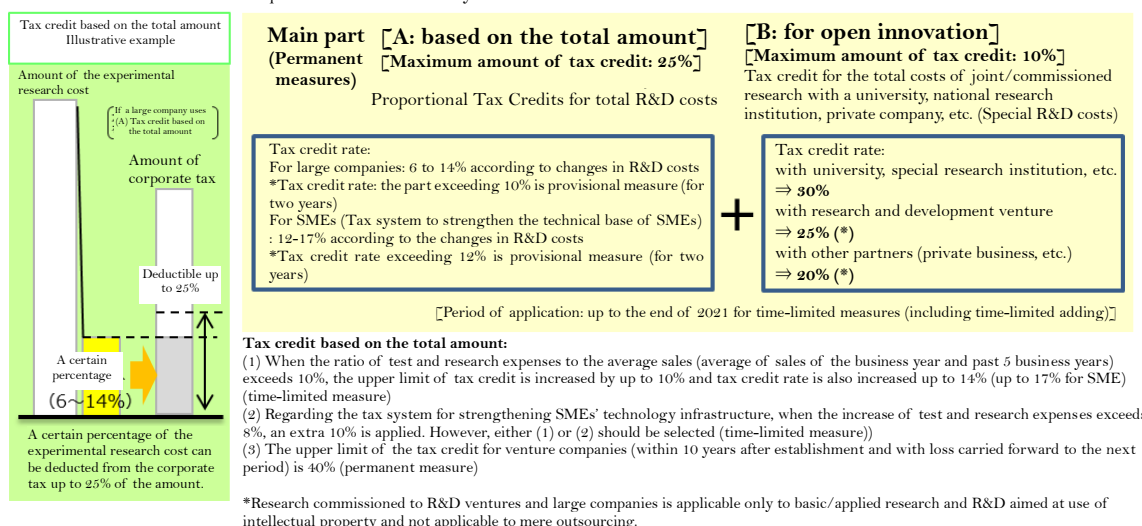
To promote R&D in the private sector, the government provides various tax measures (Figure 2-5-2).

The R&D tax system is a system to allow companies conducting R&D to deduct the amount obtained by multiplying their experiment and research costs by the tax credit rate from their corporation tax as a measure to transform Japan into “the world’s most innovation-friendly country.” The aim is to encourage innovative medium- to long-term R&D contributing to innovation creation through maintenance and expansion of R&D investment by private companies and thereby strengthen Japan’s growth and international competitiveness.

■ Figure 2-5-2/R&D taxation system ■

□ Outline of the R&D tax system

If there is an amount of experimental research expenses to be included in deductible expenses for the purpose of calculation of the amount of income, the amount obtained by multiplying the amount of the experimental research expense by the tax exemption rate may be deducted from the corporation tax of the fiscal year.



Source: METI

(5) Utilization of awards programs and authorization systems

A. The 3rd Japan Open Innovation Prize (FY2020)

With an eye toward acceleration of innovation creation in Japan, 14 pioneering or original initiatives/projects that serve as role models of open innovation were given this award by the Prime Minister and other ministers for their contributions to this effort. In order to encourage challenges by young researchers, since FY2020 the Award of the Minister of State for Science and Technology Policy is given to state-of-the-art research that will lead to social change toward commercialization in collaboration among young researchers (including students), private businesses, universities, research institutes, etc.

B Research support service/partnership authorization system

In October 2019 MEXT established the “Research support service/partnership authorization system” to authorize private research support services that meet certain requirements as “research support service/partnership.” The aim is to improve the research environment for researchers, promote science and technology and accelerate innovation creation in Japan, while at the same time supporting development of diverse activities related to research support service. For FY2020: the second year of the system, one service was authorized in March 2021.



Research support service/partnership authorization system
https://www.mext.go.jp/a_menu/kagaku/kihon/1422215_00001.htm

② Inducing a virtuous cycle of human resources for innovation creation

For innovation creation, it is necessary to promote mobility of the world’s leading researchers across organizational barriers of universities, public research institutions and companies.

The cross appointment system enables researchers to work employed by an organization and engage in R&D and education according to their role at the respective organization based on an agreement on temporary transfer among multiple organizations and under a certain degree of defined effort management. MEXT, METI and other ministries/agencies concerned are promoting the system (Chapter 4, Section 1, 2 (3)).

MEXT is also conducting review toward flexible direct cost expenditure to enable paying of labor costs to the principal researcher (Chapter 4 Section 3, 3).

③ Creating “platforms for co-creation” to concentrate human resources, knowledge, and capital

(1) Developing platforms for industry-academia-government collaboration

To promote STI promptly and effectively, it is necessary to develop platforms for industry-academia-government collaboration. Since FY2019 JST has been promoting the projects A to C below integrally under a framework: “Open Innovation Platform for Industry-Academia Co-creation.”

A. Forming an innovation ecosystem that gathers knowledge and human resources

Since FY2020 JST has been implementing the “The Program on Open Innovation Platform for Industry-Academia Co-Creation (COI-NEXT).” The program supports formation of open innovation platforms for backcast R&D in industrial-academia-government co-creation toward realization of a desirable society based on the UN Sustainable Development Goals (SDGs).

B. Developing centers for the creation of cutting-edge innovation

Since FY2013 JST has been implementing the Center of Innovation (COI) Program. Under the Center of Innovation (COI) Program, R&D is promoted in 18 bases to realize cutting-edge innovations in industry-academia collaboration.



The Program on Open Innovation Platform for Industry-Academia Co-Creation (COI-NEXT)
<https://www.jst.go.jp/pf/platform/index.html>



Center of Innovation (COI) Program
<https://www.jst.go.jp/coi/>

C. Forming Open Innovation Platform with Enterprises, Research Institute and Academia

Japan Science and Technology Agency has been implementing the Program on Open Innovation Platform with Enterprises, Research Institute and Academia (OPERA) since FY2016. Using funds for matching with private companies, the program aims to realize full-scale industry-academia partnership at the organization level toward full-fledged open innovation in Japan. The activities under the program include: integrated promotion of large-scale joint research in noncompetitive fields in consortiums of multiple companies, human resource development of master's course students and reform of industry-academia partnership of universities.



Program on Open Innovation Platform with Enterprises, Research Institute and Academia (OPERA)
<https://www.jst.go.jp/opera/index.html>

D. Exploration of technology seeds and promotion of R&D projects by AIST

The National Institute of Advanced Industrial Science and Technology (AIST) has been exploring technological seeds and promoting R&D projects while capturing the various technological needs of industry and society. Specifically, AIST is promoting activities of TIA as an open innovation hub, while participating in its 17 Technology Research Associations as part of the effort to form a place of co-creation (as of February 10, 2020.)

(2) Developing open innovation centers

A. Tsukuba Science City

Tsukuba Science City has been developed as a center of R&D and education of the highest level in Japan, away from the congestion of Tokyo. The city has research institutes and corporations, including 29 national experimental research and education institutes, and has been promoting many governmental plans, such as those for research exchanges and the functional improvement of international research exchanges.

TIA is a center of open innovation operated under the leadership of four public organizations in the city (NIMS, AIST, Tsukuba University and the High Energy Accelerator Research Organization) and the University of Tokyo. In FY2020, the 3rd phase started and TIA Vision 2020-2024 was formulated. Large R&D projects including JST projects were launched for tasks adopted by Kakehashi: TIA collaborative research program. TIA also used the Web to hold the “TIA Graduate School Summer Open Festival” as its human resource development project and “Nanotech CU PAL¹” aimed at development of young researchers.

B. Kansai Science City

Kansai Science City is promoting the construction of towns that will play a role as bases for developing the world’s culture, science and research and the nation’s economy. As of the end of FY2020, it had over 150 facilities at which various research activities were under way.

(3) Promoting Open Innovation Platform for industry academia partnership in diverse fields

MAFF has been promoting development of the Field for Knowledge Integration and Innovation (FKII) to promote research in industry-academia-government collaboration that introduces technologies of various fields into agriculture, forestry, fisheries and foods.

In April 2016 MAFF set up the Council of Industry-Academia-Government Collaboration of the FKII. As of December 2020, the council had 3,667 members including companies from diverse industries, with 166 R&D platforms set up to work on specific research tasks. In addition, the R&D platforms formed a research consortium to conduct R&D, which has supported R&D of 87 tasks through projects based on requests for proposals using the matching fund method.

(4) Creating an environment that facilitates matching of technology seeds and needs

In cooperation with the relevant ministries and institutions, MAFF holds the Agribusiness Creation Fair every year. The objective is to exhibit technology seeds from private corporations, universities, public experimental research institutions and independent administrative institutions, and to promote collaboration with institutions which are in need of technology. In FY2020 the fair was held via online in November. Private companies and other participants advancing industrial use of new technologies disseminated information through the fair. 120 organizations from around the nation took parts in the fair and the total number of page views of the special site open to the public for about one month reached 98,140.

¹ Nanotech Career-up Alliance

Section 2 Enhancing the Creation of SMEs and Startup Companies to Tackle New Business Opportunities

Entrepreneurial startups of modest size that are flexible and quick in making decisions are better suited to innovation and the commercialization of technological seeds in a short period of time. It is important to build a system for continued and effective support in close industry-academia-government collaboration to support business activities of small and medium-sized enterprises and startups toward speedy creation of new markets.

① Cultivating entrepreneurship

With the aim of further promoting entrepreneurship across Japan and contributing to its ability to create startups, Since FY2017 MEXT has been implementing Exploration and Development of Global Entrepreneurship for NEXT generation (EDGE-NEXT). In FY2020 the ministry at JST started to support comprehensive environmental improvement for creation of the ecosystem in Startup Ecosystem Cities¹.

② Promoting the creation of startups at universities

The number of university-launched startups was on the decrease for a period of time, but has been increasing in recent years, reaching 204 in FY2019.

The JST implements the Program for Creating STArt-ups from Advanced Research and Technology (START). Under this program, from the stage before starting business, it provides supports for creation of university-launched startups with growth potential by combining public funds and commercialization knowhow in the private sector. Since FY2017 START includes a program of Start-up incubation of COre Research (SCORE) that supports (1) exploration for business models by people who are willing to undertake social implementation of research results; (2) establishment of a startup support system at universities, and; (3) comprehensive environmental improvement for practical entrepreneurship education and startup creation in Startup Ecosystem Cities². In addition, the SUpport Program of Capital Contribution to Early-Stage Companies (SUCCESS³) invests in the foundation and capital increases of startups that utilize R&D outcomes of the JST, thereby promoting the commercialization of R&D results through their business activities.

③ Creating environments conducive to new business

(1) Create startup ecosystem to compete with the world's top ecosystems

Toward solution of social challenges through creation of a startup ecosystem and innovations, the

¹ See “3 Creating the environment for new businesses (1) Creation of Startup Ecosystem Cities to compete with the world top ecosystems” below.

² See “3 Creating the environment for new businesses (1) Creation of Startup Ecosystem Cities to compete with the world top ecosystems” below.

³ Support Program of Capital Contribution to Early-Stage Companies

Cabinet Office, MEXT and METI formulated “Beyond Limits. Unlock Our Potential - Strategies for creation of a startup ecosystem to compete with the world top ecosystems-” in June 2019. In FY2020 four global base cities and four promotion base cities were selected. Creation of a startup ecosystem to compete with the world’s top ecosystems is promoted through concentrated support by the government, government-affiliated organizations and private-sector supporters.

(2) Support for R&D-type startups

Through NEDO, METI is implementing the R&D-based Startup Support Program with integrated support ranging from discovery of technology seeds to their commercialization in Japan.

(3) Support by the Small Business Research System (SBIR system)

Under the small business innovation research (SBIR) system, subsidies and commissions have been granted (special subsidies) to provide small and mid-sized businesses and private persons not running a business with assistance for R&D on new technologies. Several industrialization support measures, including the provision of special loans by the Japan Finance Corp., have also been taken. In FY 2020, seven ministries (MIC, MEXT, MHLW, MAFF, METI, MLIT and MOE) designated 86 special subsidies in all and earmarked about 46.3 billion yen as expenditures for small and medium enterprises (SMEs) and micro enterprises. For the purpose of creating innovation, the system is positioned in “the Act on Activation of the Creation of Science and Technology Innovation” and the act was amended to strengthen cross-ministerial collaboration led by the Cabinet Office (enforced on April 1, 2021).

④ Helping initial demand and endorsing the trustworthiness of new products and services

(1) Development and strengthening of SMEs and startups using public procurement

In order to support startups and SMEs through public procurement, the Cabinet Office implemented the “Cabinet Office Open Innovation Challenge.” This project where startups, SMEs and others tackle themes set based on specific problems of ministries, agencies and local governments is expected to contribute to discovery and commercialization of new technologies and ideas. Applicants of adopted proposals are given advice from advisors provided by the Cabinet Office and opportunities to meet responsible persons of the ministries, agencies and local governments

Section 3 Strategic Use of International Intellectual Property and Standardization

In order to further improve the quality of intellectual property management, it is important to develop a strategy to not only use but also to maximize the value of our IP. To this end, we promote incorporation of IP and standardization strategies into business strategy, while at the same time encouraging creation of

new open innovations through heightened awareness of IP holders and utilization of patents.

① Promoting use of IP assets in innovation creation

In response to changes in the world innovation environment, the following approaches towards the development and implementation of international standardization strategies, the review of IP systems and the improvement of IP-related systems have been promoted.

(1) IP (IP rights/R&D data) management of the government's R&D projects

A. Initiatives concerning patent rights and other intellectual property rights

In order to commercialize national R&D results as much as possible, METI ensures appropriate IP management for each R&D project commissioned by the government based on the Guidelines for IP management in commissioned R&D” (May 2015).

In national R&D pertaining to agriculture, forestry and fisheries, MAFF is working on IP management assuming commercialization of research outcomes from the initiation stage of research based on the Intellectual Property Policy for Agriculture, Forestry and Fisheries” (February 2016).

B. Initiatives concerning R&D data

In the light of the progress of the 4th industrial revolution, METI developed the Guidelines for Data Management in Government-commissioned Research and Development (December 2017) in order to create new businesses and strengthen competitiveness by promoting utilization of R&D data. Based on the guidelines, the ministry launched the Natiopro Data Catalog¹ to register available R&D data in March 2018.

(2) Development and provision of patent information

The Japan Patent Office (JPO) through Patent Information Platform (J-PlatPat²) operated by the National Center for Industrial Property Information and Training (INPIT) and the Foreign Patent Information Service (FOPISER³) provides patent information of Japan and patent information of foreign countries, which is highly needed by users in Japan.

Furthermore, the INPIT provides a database service covering information of licensable patents and research tool patents which companies, universities, public experiments and research institutions, etc. intend to license or transfer.

(3) Acceleration of the examination

To meet the need among patent applicants for expedited patent rights acquisition, the JPO conducts an

¹ https://www.meti.go.jp/policy/innovation_policy/datamanagement.html

² <https://www.j-platpat.inpit.go.jp/>

³ <https://www.foreignsearch2.jpo.go.jp/>

accelerated examination that applies under certain conditions. Additionally, since August 2011, JPO has been implementing the Accelerated Examination and Accelerated Appeal Examination to Support Recovery from Earthquake Disasters, in order to support restoration activity by businesses, etc. affected by earthquakes that utilizes intellectual properties.

(4) Developing and strengthening patent examination system

The JPO worked to maintain and improve its examination capacity also in FY2020 by re-employing some examiners under limited-time contracts after the termination of their term, for example. Continued efforts were also made for development and strengthening of the patent examination system.

(5) Collective examination for IP portfolio supporting business activities

The JPO studied a new examination system to meet the needs of patent applications in response to the Global IP Initiative. The JPO has conducted a new initiative, collective examination for IP portfolio supporting business activities, under which it examines applications and grants rights interdisciplinary according to the timing of the applicant's business development, in order to support applications for comprehensive intellectual property. The new initiative applies to groups of intellectual rights (i.e., patents, design rights and trademarks) that are associated with domestic and overseas projects.

(6) Implementation and the publication of a survey on technology trend

There are calls for coordination between R&D strategies and intellectual property strategies. Therefore, the JPO surveys patent application trends in light of R&D trends, with focus on the technical fields where Japanese companies can acquire market share and the fields related to the R&D project of the government. It has published the results.

(7) Experts' support for IP utilization

JPO implements the "Project for Dispatching IP Strategy Designers to Universities" to help universities identify research results whose IP rights are not yet acquired. Through INPIT the office also implements the "Project for Dispatching IP Producer" and "Project for Dispatching IP Advisor for Industry-Academia Collaboration." The former supports universities, R&D consortiums, etc. promoting publicly-funded R&D projects. The latter supports universities deploying industry-academia collaboration toward commercialization. In FY2020, 17 IP Strategy Designers were dispatched to 20 universities, 22 IP producers were dispatched to 6 projects and 10 IP Advisors for Industry-Academia Collaboration were sent to 29 universities.

In order to assist in the formulation of research plans that are to be implemented in collaboration among universities, national R&D agencies and public experimental research institutions under national research

projects, etc. MAFF deploys approx. 150 coordinators throughout the country who are specialized in the agriculture, forestry, fisheries and food industries. This support includes the introduction of viewpoints of the management of technology (MOT), including the strategic use of intellectual property.

(8) Efforts for security export control

In FY2020, in cooperation with MEXT and other ministries/agencies concerned, METI promoted strengthening of systems of universities, research institutes, etc. to prevent the leak of technical information by: (1) holding briefing sessions on security trade control for universities, etc. and (2) dispatching export control experts to universities, etc., for example

In order to develop requirements of security export control that requires businesses applying for the government R&D projects to build appropriate security export control systems, METI worked on the funds allocation agencies and relevant ministries.

(9) Efforts for management of technical information

The revised Act on Strengthening Industrial Competitiveness that was enacted in May 2018 established a “technical information management assessment system” where business operators can receive certification for appropriate management of important information held by them from a certification body authorized by the government (as of the end March 2021, six certification bodies were authorized). In FY2020, in addition to dispatch of experts providing advice, etc. for establishment of appropriate technical information management (176 times), collaboration with industry groups highly interested in the system and development of training materials/pamphlets and PR activities through distribution of e-mail newsletters were conducted, and expert meetings (three study sessions and three WG sessions) were held for dissemination and improvement of the system.

(10) Support for acquiring IP rights of research results and promotion of their utilization

JST is making consistent efforts to support the identification of excellent research results and the acquisition of IP rights for them. Specifically, under the “Promotion of the Use of Intellectual Property”, JST supports comprehensive utilization of IP rights at universities, etc. by supporting the strategic acquisition of foreign patents for their research results and promoting utilization through collecting and packaging patents scattered across different universities, etc.

② Accelerating strategic international standardization and enhancing related support systems

(1) Promoting an intellectual property strategy and an international standardization strategy

With the progress of economic globalization, the importance of various intellectual activities that are

sources of economic growth has been increasing. To enhance the competitiveness of Japanese industries and improve the lives of the citizens, it has become important for Japan to create advanced technologies and rich culture, and to link these to the creation and expansion of businesses. The Intellectual Property Strategy serves as the foundation for such activities.

In May 2020 the Intellectual Property Strategy Headquarters decided the “Intellectual Property Promotion Plan 2020. The plan is composed of the “New Normal’ and IP Strategy (introductory part)” presenting basic policies under the New Normal after the COVID-19 pandemic and three parts presenting measures to be taken in individual fields: “Promotion of Strategic IP Utilization in an Innovation Ecosystem,” “Execution of Cool Japan Strategy” and “Establishment of Contents Creation Ecosystem. The plan includes “Acceleration of DX and Promotion of Use of AI, Data, etc.,” “Strategic Utilization of Standards,” “Contents Strategy in the Digital Age.” Following the plan, the Intellectual Property Strategy Headquarters has been leading the activities to promote the Intellectual Property Strategy in collaboration with the ministries and agencies concerned.

(2) Active efforts for international standardization

Strategic international standardization activities are important in order to strengthen the competitiveness of our industries in the global market,

Specifically, AIST set up the “standardization promotion center” on July 1, 2020 with the aim of establishing a system for standardization activities also covering cross-cutting fields. In order to conduct standardization activities more appropriately at the R&D stage, the NEDO project implemented initiatives that consider strategic use of standards at each stage of formulation of technology strategy, and project implementation, etc.

International standardization was carried out on lifecycle and quality assurance of AI as part of the “international standardization development activities in the government’s strategic fields in 2019” that is a program to accelerate strategic international standardization. AIST is playing the central role in the promotion with participation of several private businesses. For strategically important R&D themes and cross-cutting themes, AIST is promoting international standardization activities in cooperation with National R&D Agencies and private businesses. For human resource development, training courses are provided to develop young human resources who will lead international standardization based on the “three action plans to develop human resources for standardization (made public in FY2016).” METI also supported human resource development for standardization at universities by disseminating education materials for university teachers, and sending METI personnel for lectures on standardization at universities. Furthermore, the Ministry has established standardization qualification schemes through the Japanese Standard Association (JSA).

The ministry has been conducting overseas technical cooperation for collaboration with European and

Asian countries in international standardization activities and promotion of their active participation. In FY2020 METI participated in a meeting that gathered standardizing organizations of 24 countries and regions in the Pacific area and conducted bilateral meetings with standardizing organizations of Asian countries and discussed possible fields of cooperation for standardization. METI has been working to strengthen cooperation with Asian countries in international standardization activities by holding human resource development seminars for Asia in cooperation with the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) and also advancing a project for international harmonization and standards development/dissemination at the Sub-Committee on Standards and Conformance of the Asia-Pacific Economic Cooperation (APEC).

Based on recommendations of the Telecommunications Council and other bodies, MIC is promoting R&D as well as standardization activities at de jure standardization organizations such as the ITU¹ and standardization forums with the aim of reflecting Japan's information communication technologies (ICT) in international standards. In FY2020, based on the Beyond 5G Promotion Strategy (formulated in June 2020), etc. MIC set up the Beyond 5G New Business Strategy Center gathering key players of industries, academia and governments on December 18, 2020. The center is working for strategic acquisition of IP and standardization activities from the early stage of R&D.

Water supply has been included as a specific strategic field for international standardization, so the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and the Ministry of Health, Labour and Welfare (MHLW) are promoting its strategic international standardization under the IP Promotion Plan to ensure that Japanese corporations launching water supply and sewerage system businesses in the global market can achieve high competitiveness. Currently Japan is playing active and leading roles in the working groups, etc. on "Water Reuse (ISO²/TC³282)," "Sludge recovery, recycling, treatment and disposal (ISO/TC275)," "Asset management (ISO/TC224/WG⁴6 and ISO/TC251)," "Stormwater management (ISO/TC224/WG11)," and "Risk management (ISO/TC224/WG7)."

(3) Promotion of the Global IP Initiative

It is important to improve global IP infrastructure so that Japanese companies can smoothly engage in business internationally. Currently, the JPO is implementing the "patent prosecution highway (PPH)" with 45 nations (as of January 2021). This will allow patent applicants whose patents have been deemed patentable to apply for early examination in other countries. The JPO and the U.S. Patent and Trademark Office (PTO) have conducted the JP-US Collaborative Search Pilot Program on August 1, 2015. Under this program, the patent examiners in Japan and the U.S.A. conduct independent searches on advanced

¹ International Telecommunication Union

² International Organization for Standardization

³ Technical Committee

⁴ Working Group

technology applications and share the search results and opinions before forwarding the examination results to the patent office of each country. For Patent Cooperation Treaty (PCT¹) international application, the Patent Cooperation Treaty Collaborative Search and Examination (PCT CS&E) was implemented up to June 30, 2020. Under PCT CS&E, five offices in Japan, the U.S., EU, China and South Korea collaborated to produce international search reports.

Section 4 Reviewing and Improving the Regulatory Environment for Innovation

In order to ensure speedy commercialization of knowledge and technologies that are the source of innovations, and their adaptation to the exponential development of ICT, the government will review the systems for new products and services to maximize innovations' potential to change society.

① Reviewing systems in accordance to new products, services, and business models

(1) Regulations and systems for accelerating innovation

Although regulations and systems have been established for the promotion of safe, smooth R&D, these could potentially impede innovation due to excessive strictness. The Japanese government has been promoting a system called “National Strategic Special Zones.” The system is positioned as a breakthrough point for regulatory and system reforms under the Japan Revitalization Strategy. In addition, the conventional “Comprehensive Special Zone System” and other special zone systems are expected to be increased. These systems are expected to accelerate innovation.

A. Efforts for National Strategic Special Zones

Based on the Act to Partially Amend the Act on National Strategic Special Zones (act No.34 on June 3, 2020) the government is promoting efforts toward: realization of the Super City Initiative aimed at the “future city” that will create a future life before the rest of the world, as well of use of the regional sand box system for speedy and smooth implementation of demonstration experiments of advanced and innovative near-future technologies. In National Strategic Special Zones, the government will continue to reform extremely restrictive regulations and accelerate nationwide expansion of special zone achievements that do not have particularly harmful influence.

B. Efforts for the Comprehensive Special Zone System

The government designated International Strategic Zones, in order to form industrial and functional clusters that will drive Japan's economic growth. It has also designated Comprehensive Special Zones for Local Revitalization to strengthen regions through local vitalization in which the use of local resources is

¹ Patent Cooperation Treaty

maximized, and it has been comprehensively supporting these zones through preferential measures on regulations and support measures regarding taxation and financing.

② Improving IP systems in response to the tremendous development in ICT

In the age of the 4th industrial revolution, use of new information properties including AI creations, 3D data and databases whose creativity is hard to recognize will spread beyond contents industries (e.g., novels, music and paintings) to other industries (manufacturing, agriculture, advertising, insurance and financial, transportation, healthcare, etc.) Building an IP system that forms their foundation has become increasingly important in order to strengthen our industrial competitiveness.

The Japan Patent Office launched activities of the AI examination support team that accumulates and shares knowledge and examination cases concerning the latest AI-related technologies and studies related patent examination measures in cooperation across technological fields of individual examination divisions.

Section 5 Developing Innovation Systems that Contribute to “Regional Revitalization”

We can find strengths and buds to create innovations in various regions. In order to make use of regional features to create new products/services and increase added-value of the existing industries, it is important to build an autonomous and sustainable innovation system in each region.

① Revitalizing regional companies

In order to support attempts to open up a new field or launch a new business by enterprises that will lead local economies, METI is pushing construction of support networks of organizations (e.g., universities, public experimental research institutions, financial institutions) supporting regional innovation, and comprehensive support by these networks in accordance with the development stage of the business. In addition, METI established the “Global Network Council Japan” by organizing experts in the international markets and other areas. The council is supporting development of commercialization strategies and cultivation of markets with a view to the global market.

By utilizing the New Market Creation Standardization System, the ministry decided on the standardization of 42 items that had been proposed by well-established businesses from 2016 to the end of March 2021. In addition, METI expanded the partner organizations of the Partnership System for Supporting Utilization of Standardization to 167 in 47 prefectures across the country in the period from 2015 to the end of January 2021. Under this system, local authorities and business promotion organizations, local financial institutions, universities and public research institutions (partner organizations), and the Japanese Standards Association work in collaboration and provide information and advice to local businesses on their strategic utilization of standardization.

② Driving innovation ecosystems that make use of local characteristics

(1) Development of a regional innovation system

Under the Program for Building Regional Innovation Ecosystems, MEXT is supporting commercialization projects with high risk and high social impacts which gather human resources and technologies around a core technology or other regional source of competitiveness, and which formulate a commercialization plan that can be expanded globally. The program has adopted 21 regions. For Kanagawa region, the program supported the development of a COVID-19 rapid test system using the SmartAmp method in the FY2020 supplementary budget. In addition, MEXT launched “DEaling with Social Issues in ReGioNs through Science and Technology Innovation (DESIGN-i)” in FY2019 and has adopted six regions. DESIGN-i aims to construct needs-pull regional innovation ecosystems and reform of the communities.



Program for Building Regional Innovation Ecosystems
https://www.mext.go.jp/a_menu/kagaku/chiiki/program/1367366.htm

Under the Strategic Information and Communications Research and Development Promotion Program (SCOPE) and based on the 1st, 2nd and 4th Interim Reports on Desirable New Information Communication Strategy” MIC has been promoting R&D of ICT that will contribute to creation of new value, change of social systems, regional vitalization and problem solution while keeping in mind practical application and social implementation in response to the era of Beyond 5G.

In order to facilitate innovation creation and productivity improvement by local companies amid rapid progress of technological innovation, through the “regional innovation infrastructure project” METI is supporting early introduction of advanced equipment and human resource development, which contributes to establishment of an enterprise support system by public experimental research institutions and universities. The program to create centers for industry-academia integrations was launched in FY2020. Under the program the ministry supports pioneering initiatives and establishment of model centers toward creation of common values through industry-academia integration that will deepen and expand open innovations that start from universities.

Under “the program to promote research for innovation creation” implemented by Bio-oriented Technology Research Advancement Institution (BRAIN), MAFF is promoting R&D based on proposal solicitation with focus on R&Ds that combine diverse knowledge and technologies in various fields. It specifically supports research on local innovation strategies. In addition, MAFF has assigned industry-academia-university collaborative coordinators nationwide who are experts in agriculture, forestry and

fishery and on food industries. They promote R&D in these fields through collection/identification of needs and collection/provision of seeds while supporting industry-academia-government matching, introducing and supporting R&D funding and supporting commercialization. MAFF also hosts local matching forums to support local R&D and the diffusion of technology.

An international education and research center will be established as the hub of creative reconstruction to conduct R&D and human resource development essential for creative reconstruction of Fukushima with the leadership of the Reconstruction Agency. The aim is to change the industrial structure and social system by social implementation and industrialization of research outcomes through industry-academia-government initiatives. (See Chapter 3 Section 2-1 (4), Chapter 3.)

AIST is working in close coordination with public experimental research institutions (PERIs) through human exchange to discover needs of local companies and provide them technical support using technology seeds of AIST. Specifically, AIST commissions or employs 145 PERI personnel and former senior officials as AIST Innovation Coordinators who coordinate “bridging” to local companies, and has been strengthening the cooperation system among PERIs as well as their cooperation with AIST through the Industrial Technology Liaison Council and also supporting improvement of technical abilities of personnel and human resource development at PERIs. Furthermore, AIST is actively promoting cooperation with local authorities by signing a comprehensive agreement, and cooperation in the technical field suitable for the characteristics of the regional industry by using the subsidy program of local authorities. This way, by transferring its technical seeds to business activities at the local and national levels to contribute to technical competitive power of local companies, AIST is working on regional revitalization.

(2) Supporting protection of regional IP

JPO conducted visiting interviews where examiners and appeal examiners travel to interview places across Japan, online interviews in which applicants can participate using their own personal computer, and circuit appeal/trial board for oral proceedings across Japan. Using INPIT¹ Kinki Headquarters the JPO provided local IP support with focus on Kinki District.

③ Promoting policies that encourage local initiative

(1) Support for independent and sustainable regional growth

Support from a medium- to long-term perspective is important for individual regions to build their innovation system based on their respective strengths toward independent and sustainable growth.

The Cabinet Office is making a study on setting inspection indicators so that ministries, agencies and local authorities can understand the situation of Innovation Ecosystem in the regions.

¹ National Center for Industrial Property Information and Training

Based on the 2nd action plan for revitalization of regional IP formulated in July 2020 and “Central KPI¹ and Regional KPI,” the Patent Office provided hands-on and other supports for the regions and SMEs. The office will continuously implement measures to support the regions and SMEs based on the plan, etc. in the next fiscal year and after.

Section 6 Cultivating Opportunities for Generating Innovation in Anticipation of Global Needs

In response to global challenges including energy, resources and food security and natural disasters, we will explore opportunities to create innovations by strategically taking leadership using our technical capabilities and experience in field implementation and anticipating future needs.

① Promoting R&D that anticipates global needs

For the purpose of referring to overseas information in formulating policies on science and technology, a system needs to be created for the continuous collection, accumulation and analysis of overseas information in a structured and organized manner, and for the use of such information across multiple sectors and disciplines. MEXT and other organizations have been working on this.

As part of its exploration and analysis of long-term changes toward R&D meeting global needs in the future, the National Institute of Science and Technology Policy (NISTEP) has been conducting science and technology foresight surveys every 5 years or so since FY 1971 and published the report of the 11th survey in December 2019. This survey studied the “future image of desirable society” and “medium- and long-term perspective of science and technology development” and presented a conceptual scenario: “flexible society brought about by reviving and rethinking humanity” as “a future image of society brought about by the development of science and technology.” The survey also identified eight “close-up science and technology areas” (areas with high potential for multidisciplinary and interdisciplinary R&D) based on AI-related technologies and examination by experts.

The Center for Research & Development Strategy (CRDS) of the JST is investigating and analyzing overseas trends that benefit the formulation of STI policies.

In order to contribute to strategic research and development in light of the rapidly changing R&D trends including innovative technologies and the progress of globalization, MAFF studies R&D trends in other fields and countries, and formulates and releases “Innovation Strategy for Agriculture, Forestry and Fishery Research” that presents the direction of the priority research fields to be promoted.

JSPS Overseas Offices collect information on trends in scientific research, support efforts by Japanese universities to expand their international bases and activities, collaborate with overseas organizations

¹ Key Performance Indicator

engaging in science promotion and hold symposiums.

The Overseas Offices are also strategically promoting international joint research and research exchanges with the world's leading science and technology nations to address the economic and social challenges we are facing (Chapter 4 Section 2-1(4), Chapter 7 Section 3).

② Developing systems to promote inclusive innovation

(1) The promotion of cooperation with developing countries on issues of global concern

To promote science and technology cooperation with developing countries in Asia, Africa and Latin America etc., MEXT, the JST, Japan Agency for Medical Research and Development (AMED), the Ministry of Foreign Affairs (MOFA) and Japan International Cooperation Agency (JICA) have been collaboratively implementing the Science and Technology Research Partnership for Sustainable Development (SATREPS¹) program by utilizing Japan's excellent science and technology and Official Development Assistance (ODA²). The program promotes international joint research to address global issues and promote future utilization of research outcomes based on the needs of these countries. From FY 2008 through FY 2020, 156 SATREPS projects in 52 countries (including 84 projects in Asia, 41 projects in Africa and 23 projects in Latin America and so on) were adopted for implementation.

MEXT launched a program that combines international joint research with government scholarships for international students. Specifically, the government provides scholarships for international students who wish to study at Japanese universities that participate in the SATREPS program. This program makes it possible for young researchers from countries participating in international joint research projects to earn degrees in Japan. Thus, MEXT is cooperating with other countries in developing their human resources.

¹ Science and Technology Research Partnership for Sustainable Development

² Official Development Assistance