

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.

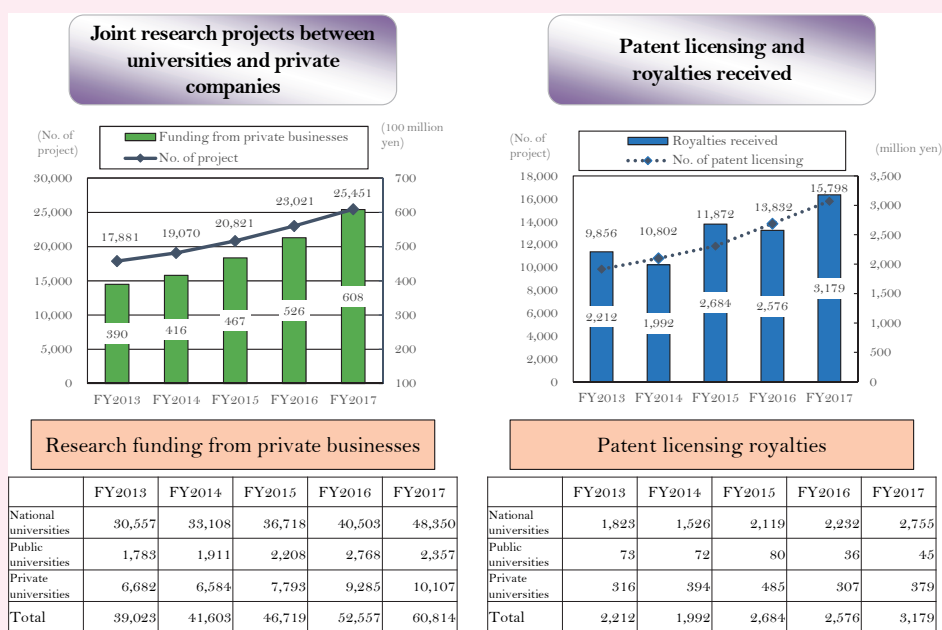
1 Enhancing systems of promotion in companies, universities, and public research institutes

(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 2017, the number of collaborative research activities between universities and private corporations was 25,451 (a 10.6% increase over the previous year) and the amount received for joint research from private corporations was about 60.8 billion yen (a 15.7% increase over the previous year). In contrast to FY 2014, the amount received for joint research increased by approximately 54%. In addition, the number of patent licensing reached 15,798 (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 licenses denotes the number of patents that have been licensed or transferred (including patents pending)
 4. A broken line is used for FY 2012, because that was the year when countries began to use the counting method stipulated in the Patent Cooperation Treaty (PTC).
 5. “Total” and “total of intermediate total of national, public and private universities” amount may not match because values of less than 1 million yen are rounded.

Source: Implementation Status of Industry-Academia-Government Collaborations at Universities (2017), MEXT (as of February 27, 2019)

B. Activities of the Technology Licensing Organization (TLO)

As of August 28, 2017, 35 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 FY 2016, the number of patent licenses reached 9,120.

In this regard, also as a response to the 4th industrial revolution in recent years, further promotion of the return of research results of universities back to society will contribute to improvement of industrial technology and creation of new business fields. In this context, the “Committee on strengthening of industrial-academia collaboration functions at universities” reported a summary of its discussions on modalities of university-TLO partnership and development of centers for technology transfer as measures for utilization of university research results in an innovation system (July 2018).

(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 giving consideration to 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. In response, 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 to strengthen industry-academia-government collaboration and prescriptions for the challenges from the industry perspective. MEXT is working to spread the guidelines. In FY2018 the ministry started development of “Open Innovation System” to encourage private investment by promoting large-scale joint research through development of a system for centralized management of large-scale research that is deeply involved with corporate business strategies (with focus on competing areas).

In addition, to appropriately address the diverse risks (e.g. conflicts of interest, the prevention of technology leaks) that accompany improvements in industrial-academic collaboration, MEXT has been supporting the creation and expansion of a system for managing the risks involved in the industry, university and government collaborative activities through its Industry-Academia-Government Collaborative Risk Management Model Project, while at the same time supporting development of a system to implement cross-cutting management by the headquarters. Further in May 2018, the ministry jointly with Japan Business Federation and METI revised and published the “University Fact Book for Promotion of Matching in Industry-Academia-Government Joint Research” to advance “visualization of universities’ efforts for industry-academia-government collaboration.

Under the Industry-Academia Collaborative Support Project, the Ministry of Agriculture, Forestry and Fisheries (MAFF) has allocated 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 seamlessly covers the exploration of prospective technological seeds developed at universities and public research institutes and their practical application in industry, 2) the Strategic Promotion of Innovative R&D (S-Innovation), which supports R&D carried out under themes selected from excellent research outputs in academia and aims to create technological foundations of new industries, 3) Collaborative Research Based on Industrial Demand, which supports basic research in academia that could resolve technical challenges commonly seen in industry and 4) the Next-Generation Technology Transfer Program (NexTEP) to support private corporations that are working on the large-scale practical application of university research outputs, whose application involves development risks.

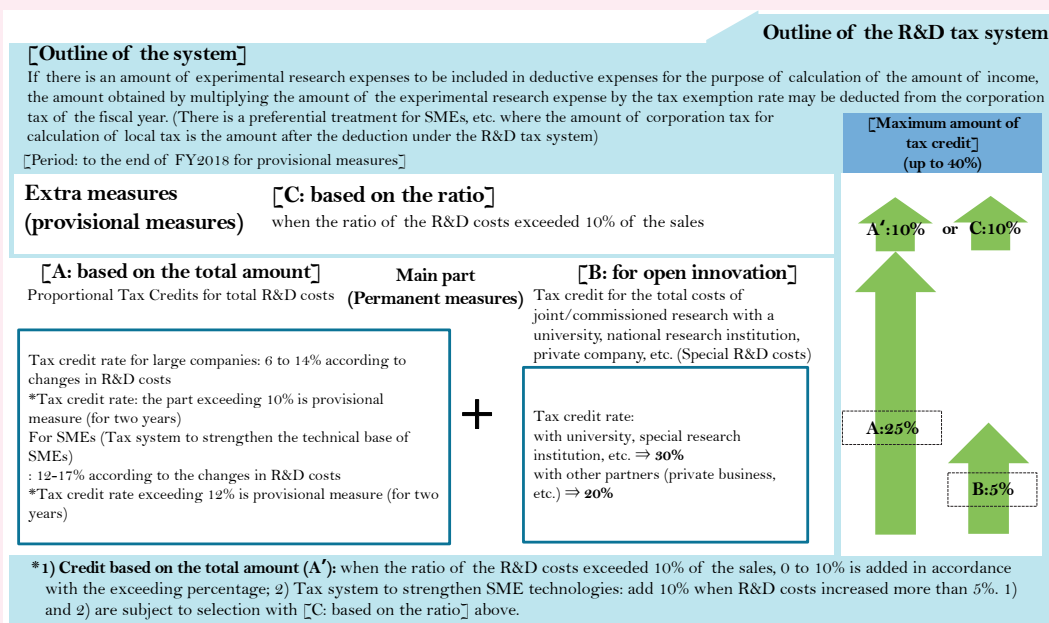
The Ministry of Internal Affairs and Communication (MIC) is promoting technological and social demonstrations of IoT and a new generation network in industry-academia-government partnership using the NIST comprehensive test bed that has been developed and managed by the National Institute of Information 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 measures¹ (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



Source: METI

(5) Utilization of awards programs

A. The 1st Japan Open Innovation Prize (FY2018)

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 (Table 2-5-3).

¹ System of corporation tax credit for businesses conducting test and research in accordance with the amount of test and research expenses

■ Table 2-5-3/The 1st Japan Open Innovation Prize

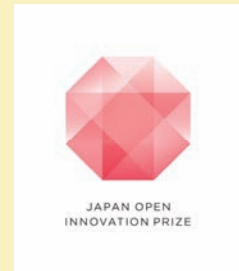
Award	Initiative/project	Key organizations
Prime Minister's Award	Future health innovation project to realize "life expectancy revolution" using super multi-item health big data	Hirosaki University Maruman Computer Service K.K. Kao Corporation
Minister of State for Science and Technology Policy Award	Challenge by MITSUBACHI PRODUCTS, a start up from a big company	Mitsubachi Products Co.,Ltd. Panasonic Corporation BeeEdge Co.,Ltd. KAMAKIRI WORKSHOP Inc. STUFF.Co.,Ltd.
Minister of Internal Affairs and Communications Award	Development and operation of a real-time tsunami flood damage prediction system	Tohoku University Kokusai Kogyo Co., Ltd. NEC Corporation A2 Corporation RTi-cast Co., Ltd.
Minister of Education, Culture, Sports and Science Award	Industry-academia co-creation from the stage of basic research: organization-organization collaboration	Osaka University Chugai Pharmaceutical Co., Ltd. Otsuka Pharmaceutical Co., Ltd. Daikin Industries, Ltd.
Minister of Health, Labour and Welfare Award	Development of SCOT (Smart Cyber Operating Theater) to realize Medical IoT	Tokyo Women's Medical University DENSO CORPORATION Hitachi, Ltd.
Minister of Agriculture, Forestry and Fisheries Award	From a public test site in industry-academia-government collaboration in Miyazaki Prefecture Establishment of a venture company "Food Safety Analysis Center" and social implementation of analysis technology of residual agricultural chemicals	University of Miyazaki Miyazaki Prefecture Shimadzu Corporation Miyazaki Prefecture Industrial Promotion Organization Miyazaki Agricultural Research Institute
Minister of Economy, Trade and Industry Award	Social implementation of innovation through JR East Start Up Program	East Japan Railway Company JR EAST START UP CO., LTD. Origami Inc. TBM Co.,Ltd. Signpost Corporation
Minister of Land, Infrastructure, Transport and Tourism Award	Construction and development of Tohoku Infrastructure Management Platform	Tohoku University
Minister of Environment Award	Global observation of GHG using regular passenger flights (CONTRAIL Project)	National Institute for Environmental Studies Meteorological Research Institute Japan Airlines Co., Ltd. JAMCO Corporation JAL FOUNDATION

Award	Initiative/project	Key organizations
Keidanren (Japan Business Federation) Chairman Award	ONE JAPAN: platform of young people from big companies	ONE JAPAN NIPPON TELEGRAPH AND TELEPHONE EAST CORPORATION Loan Deal Co., Ltd. Japan Broadcasting Corporation Japan Exchange Group, Inc. McCann Erickson Japan Inc.
President's Award, SCJ	Realization of a national consortium for regenerative medicine to support clinical studies including regenerative medicine	The Japanese Society for Regenerative Medicine
Selection Committee Special Award of the Japan Open Innovation Prize	Construction of an ecosystem for human resource development and innovation through "rental transfer"	Loan Deal Co., Ltd. NIPPON TELEGRAPH AND TELEPHONE WEST CORPORATION The Kansai Electric Power Company, Incorporated TAIHO PHARMACEUTICAL CO., LTD. Panasonic Corporation
	Construction of a platform for creation of new industry through genetically modified silkworms	National Agriculture and Food Research Organization Gunma Sericultural Technology Center Immuno-Biological Laboratories Co., Ltd Nitto Boseki Co., Ltd.
	Development and practical application of bioresorbable bone substitutes Cytrans Granules	GC Corporation Kyushu University Tokushima University

Colum 2-11 Establishment of Japan Open Innovation Prize

With intensifying international competition in innovation creation in recent years, the importance of open innovation has been increasing to meet social needs and create new value. The great changes in the creation process of science technology innovations also call for collaboration of various industry, academia and government entities. In light of this situation, the government reviewed the existing Award for Contribution to Industry-Academia-Government Collaboration and established the Japan Open Innovation Prize to honor diverse and novel initiatives not only in industry-academia-government collaboration but also covering broader collaborations including industry-industry, citizen and user collaborations.

In order to accelerate innovation creation the prize honored pioneering or highly original initiatives/projects that are expected to serve as role models in the future, awards are given by the Prime Minister, other ministers and presidents of economic and academic organizations in order to spread open innovation in Japan. 14 initiatives/projects were honored by the 1st award



Logo of Japan Open Innovation Prize
Source: Cabinet Office

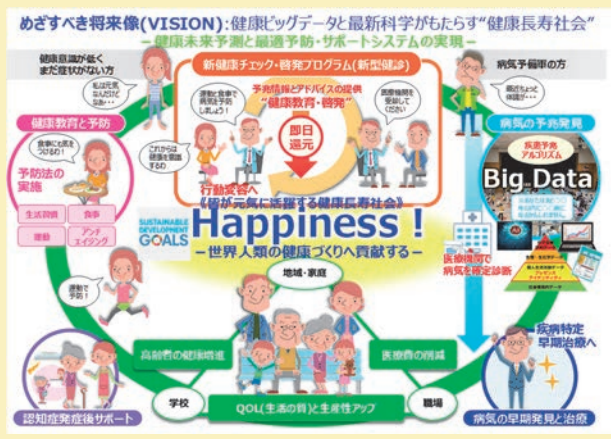


Symposium in commemoration of the 1st Japan Open Innovation Prize and awarding ceremony
Source: Cabinet Office

<Prime Minister Award>
Future health innovation project to realize “life expectancy revolution” using super multi-item big data on health

[Outline]
In Aomori, the prefecture with the shortest life expectancy in Japan, AI researchers, biostatisticians and partner companies under the leadership of Hirosaki University analyzed big data of 2000 health items obtained from resident health examinations, and developed and socially implemented disease development prediction models and related businesses in strong industry-academia-public-private collaboration.

[Points of the award]
A scheme has been formed to develop forecasting/prevention methods by opening the health big data that were carefully collected as a community project since 2005. The initiative can make a big contribution to changing in residents’ sense of values



Conceptual diagram of Future health innovation project to realize “life expectancy innovation” using super multi-item health big data
Source: Hirosaki University

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 on the premise of the human resource and payroll management reform at the national universities (Chapter 4 Section 3, 3).

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

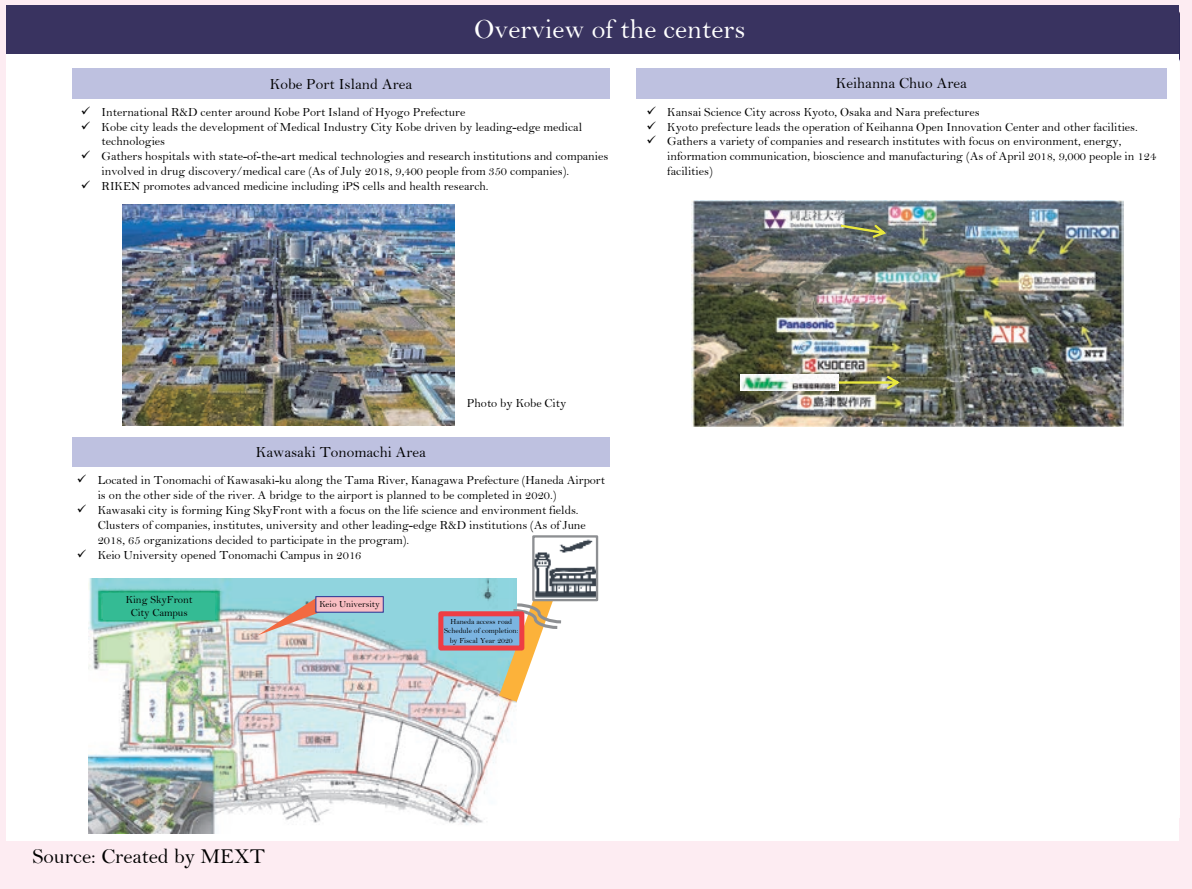
(1) Developing platforms for industry-academia-government collaboration

To promote STI promptly and effectively, it is necessary to develop forums for industry-academia-government collaboration.

A. Formation of a world-leading locally oriented R&D and demonstration base

MEXT has been implementing the World-leading Locally Originated R&D and Demonstration Base (Research Complex) Promotion Program towards the creation of world-class innovations and regional revitalization. The program aims to develop research complexes to assist local industries, universities, governments and financial institutions in their efforts for commercialization of the results of advanced and collaborative R&D by researchers in different fields in Japan and abroad, which is integrated with human resource development. In FY 2018, the ministry provided support for three complexes (Figure 2-5-4).

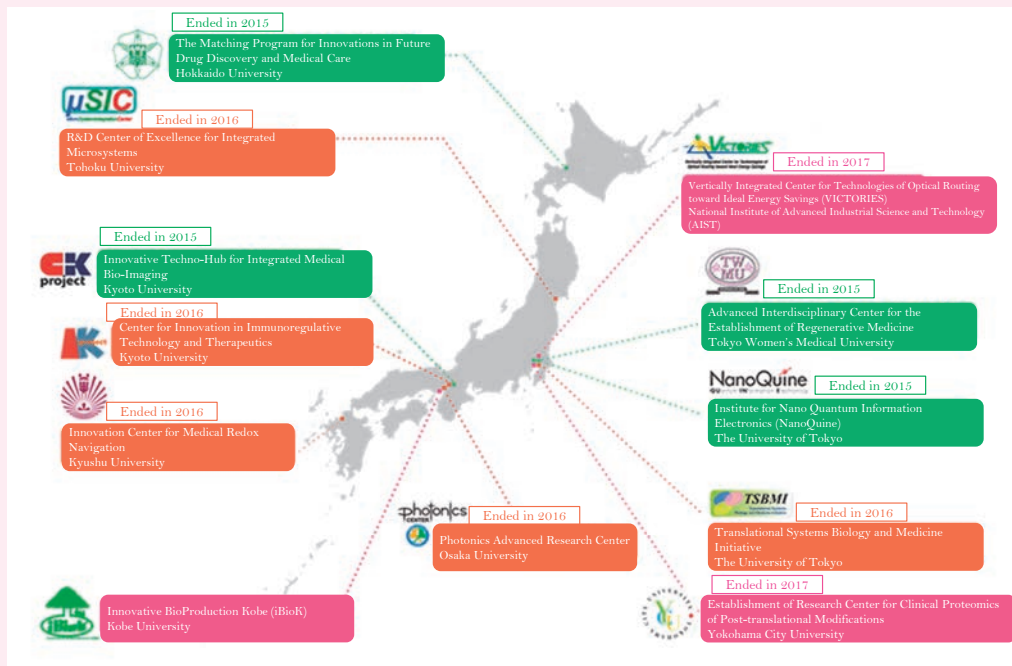
■ Figure 2-5-4/ Program to promote world-class community-based R&D and demonstration centers (research complex)



B. Creation of Innovation Centers for Advanced Interdisciplinary Research Areas

MEXT is promoting the Creation of Innovation Centers for Advanced Interdisciplinary Research Areas to form bases for R&D, from the first stages to future commercialization under industry-academia collaboration for advanced interdisciplinary research areas, which are considered important for innovation creation; one institution has been supported in FY2018 (Figure 2-5-5).

■ Figure 2-5-5/List of projects being implemented under the Creation of Innovation Centers for Advanced Interdisciplinary Research Areas

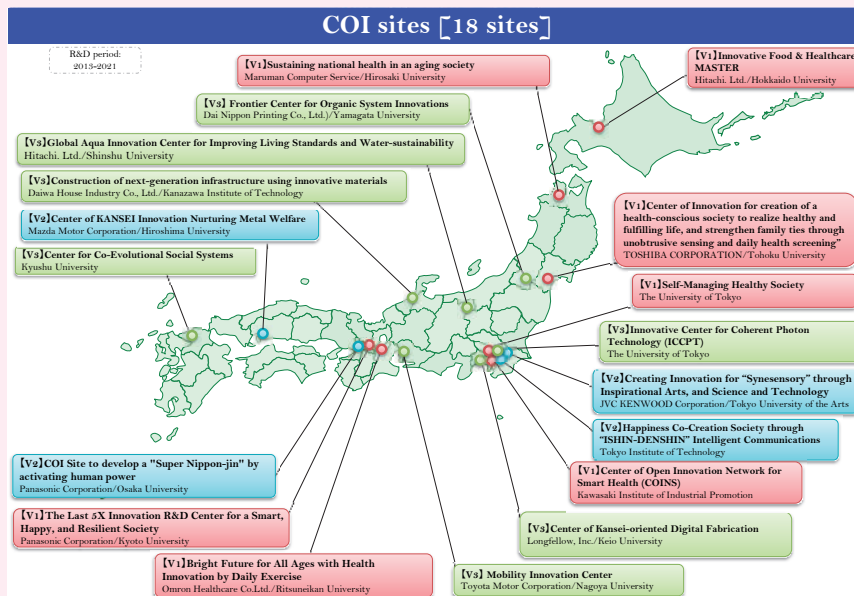


Source: Created by MEXT

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

Since FY2013 MEXT 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 (Figure 2-5-6) (Part I, Chapter 4 Section 2, (1)).

■ Figure 2-5-6/COI sites



Source: Created by MEXT and JST

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 the activities of Tsukuba Innovation Arena (TIA), an open innovation hub. AIST has participated in 18 technology research associations as part of an undertaking to form a co-creation platform (as of January 2019).

D. 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.

(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 approximately 150 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 FY2018, the 9th year after its establishment, the center produced innovations through enterprise partnership, which include practical application and productization of results of material and power device development and practical application tests of LSI based on a new principle. As regards human resource development project of TIA, the Summer Open Festival gathered 383 students and company researchers, and Nanotech CUPAL¹ aimed at fostering young researchers had 200 participants in total (about 50 people participated in the both events).

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 FY2018, it had more than 140 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 technological innovation and realize commercialization based on the market needs at

¹ Nanotech Career-up Alliance

an unprecedented pace by introducing innovative 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 March 2019 the council had 3,057 members including companies from diverse industries, with 164 R&D platforms set up to work on specific research tasks. In addition, the R&D platforms formed a research consortium to conduct innovative R&D, which has supported R&D of 43 tasks through projects based on requests for proposals using the matching fund method. Other efforts include holding of regional matching forums to support local R&D and dissemination of technologies.

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

In order to promote effective matching of technology seeds and needs to accelerate industry-academia and inter-industry open innovation and creation/development of R&D-based startups, the Cabinet Office aims to create an environment for autonomous and flexible cross-sectoral collaborations and exchanges of various matching projects by relevant ministries/agencies and the industry. To this end, the Cabinet Office set up the Science & Innovation Integration (S&II) Conference in July 2017. As part of the activities, in 2019 the office implemented lectures and a symposium on matching of technology seeds and needs and inter-industry exchange of human resources for support. It also started a hearing survey toward construction of a network of public and private human resources for support.

MEXT and METI, in cooperation with the JST and New Energy and Industrial Technology Development Organization (NEDO), held the Innovation Japan 2018 - University Trade Fair & Business Matching Event, which was Japan’s largest matching forum, with people gathering from universities, public research institutions and private corporations at Tokyo Big Site on August 30 and 31, 2018.

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 FY 2018, the exhibition was held in November in an exhibition hall where private corporations were promoting industrial use of their new technologies. At the fair, 137 institutions from throughout Japan exhibited their seeds and about 38,000 people attended.

■ Table 2-5-7/Major measures for strengthening of the system to promote open innovation (FY2018)

Ministry	Implemented by	Project
MEXT	MEXT	Development of an open innovation organization

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 an entrepreneurial mentality

Since FY2017 MEXT has been implementing Exploration and Development of Global Entrepreneurship for NEXT generation (EDGE-NEXT) to enhance venture creation in Japan through an entrepreneur development program for undergraduate and graduate students, young researchers and others.

2 Promoting the creation of startup companies at universities

The number of university-launched startups decreased to 47 in FY2010 but has been increasing in recent years, reaching 127 in FY2016 (33.7% increase against the previous year). For the future, it is necessary to improve the environment for sustainable management including business tasks such as market cultivation toward creation of high-quality university-launched startups that can identify true market needs and grow into global businesses.

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 ventures with growth potential by combining public funds and commercialization knowhow in the private sector. Since FY2017 START includes program of Start-up incubation from CORE REsearch (SCORE) that provides human resources who are willing to undertake social implementation of research results with entrepreneurial education and supports their exploration for business models. In addition, the Support Program of Capital Contribution to Early-Stage Companies (SUCCESS) invests in the foundation and capital increases of startups that utilize R&D outcomes of the JST, or offers labor and technical support whereby early-stage startups can promote the commercialization of R&D results through their business activities.

3 Creating environments conducive to new business

(1) Support for R&D-type startups

MIC has been implementing the Challenge Program for ICT Innovation Creation (I-Challenge!). The program uses the connoisseur capabilities, management know-how and project development abilities of experts who support business projects to support R&D during the business model verification phase, so that SMEs that have innovative technological seeds and ideas can start new businesses.

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. With the aim of revitalizing partnerships with startups in industry and accelerating commercialization by startups, the ministry published, following the “Guidance on Collaboration (first edition)” summarizing the obstacles that operating companies and startups face in the process of partnership, “Guidance on Collaboration (second edition)” compiling measures to overcome possible obstacles in operating companies that are believed to face many challenges.

(2) Support by the Small Business Innovation 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 business¹ with assistance for R&D on new technologies. Several industrialization support measures, including the provision of patent fee reduction/exemption and special loans by the Japan Finance Corp., have also been taken. In FY 2018, seven ministries (MIC, MEXT, MHLW, MAFF, METI, MLIT and MOE) designated 91 special subsidies in all and earmarked about 46 billion yen as expenditures for small and medium enterprises (SMEs) and micro enterprises.

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

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

To support small, medium and venture companies by using government procurement, the Cabinet Office implemented the “Cabinet Office Open Innovation Challenge 2017” where such companies try to meet concrete needs of state organs and discover new technologies and ideas toward commercialization. 15 proposals certified under the program have been given counseling from advisors provided by the Cabinet Office and opportunities for matching with operating companies. With the aim of innovating government projects and securing initial demand for the small, medium and venture companies, it developed guidelines for promotion of use of such companies for government procurements.

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

¹ For example, university researchers and other individuals who intend to start a new business or establish a company.

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

To respond to the increasingly sophisticated and diversified user needs for patent information, the Japan Patent Office (JPO) through the National Center for Industrial Property Information and Training (INPIT) has provided a new patent information provision service called Patent Information Platform (J-PlatPat²), which provides patent information through the Internet.

The JPO has provided the System for Searching and Translating Documents from Chinese and Korean, which aids investigations on the burgeoning patent documents of China and South Korea, and the Foreign Patent Information Service (FOPISER³), which provides patent information of ASEAN⁴ and other countries.

Furthermore, in order to help promotion of open innovation the INPIT provides a data base service covering information on licensable patents and research tool patents which companies, universities, public experiment and research institutions, etc. are ready to license or transfer.

The JST is making efforts that range from the discovery of high-quality research achievements through support for patent acquisition and onward to industrialization. Specifically, the agency is giving full support to the utilization of intellectual property through the Promotion of the Use of Intellectual Property. This includes supporting the strategic acquisition of foreign patents by universities through use of their research results, collecting and packaging some patent rights scattered across some universities for more efficient use and offering patent information to universities free of charge through the Internet (J-STORE⁵).

(3) Acceleration of the examination system

To meet the need among patent applicants for expedited patent rights acquisition, the JPO has conducted an accelerated examination system that applies under certain conditions. Additionally, they have, since August 2011, been implementing the Accelerated Examination and Accelerated Appeal Examination to Support Recovery from Earthquake Disasters, in order to speed the examination of patent applications from people and business facilities affected by earthquakes, so as to allow them to apply intellectual property towards restoration.

(4) Developing and strengthening patent examination system

The JPO worked to maintain and improve its examination capacity also in FY2018 by re-employing some

¹ http://www.meti.go.jp/policy/innovation_policy/data_manegement.html

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

³ Foreign Patent Information Service <https://www.foreignsearch.jpo.go.jp/>

⁴ Association of South-East Asian Nations

⁵ <https://jstore.jst.go.jp/>

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

In recent years, along with the globalization of business activities and the diversification of business structure, the intellectual property strategies of businesses have been changing to those that originate from their business. 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, to facilitate the utilization of patent information on R&D. Therefore, the JPO has comprehensively analyzed technology trends by analyzing patent application trends in light of R&D trends and market trends. It has published the results.

(7) Experts' support for commercialization and crosslink

In order to create internationally competitive industries, the JPO through the INPIT has dispatched intellectual property management experts, called Intellectual Property Producers, to universities and R&D consortiums which are promoting R&D projects, where public funds are allocated in expectation of innovative output. To expedite the use of IP by Universities, the JPO INPIT dispatches "IP Advisors for industry-academia collaboration" who are experts in IP management to universities engaging in cooperative industry-academia activities toward commercialization.

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 FY2018 METI in cooperation with MEXT and other ministries/agencies concerned promoted strengthening of systems of universities, etc. to prevent the leak of technical information by: (1) holding briefing sessions on security trade control for universities, etc.; (2) dispatching export control experts to universities, etc.; (3) supporting network construction by people in charge of export control at universities and national research and development agencies; (4) providing education materials for researchers, for example.

(9) Efforts for management of technical information

In order to promote open innovation by increasing predictability (for people outside the organization) of appropriate management of information including technical information that can be a source of corporate competitiveness, a system of certification by institutions certified by the government was established in the revised Act on Strengthening Industrial Competitiveness enacted in May 2018. The act was enforced on September 25, 2018.

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 June 2018 the Intellectual Property Strategy Headquarters launched the IP Strategy Vision and the IP Promotion Plan 2018. Toward its realization, the government has been studying environmental improvement in order to encourage trials, appropriately evaluate failures, foster leading edge talents and facilitate their activities. The plan includes “evaluation of business value of IP” for effective utilization of IP in business. Other initiatives set forth in the plan include: Innovation creation and promotion of brand construction through design-based management; acceleration of open innovation including study of intellectual asset platforms, and; design of standards and rules with business models in mind. According to 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

In order to strengthen the competitiveness of our industries in the global market, the government submitted a bill to amend the Industrial Standardization Act to the 196th Diet session. The amendment includes expansion of the coverage of Japan Industrial Standard (JIS Act) to services, etc. and strengthening of the penal regulations to ensure credibility of transactions using JIS mark. The amended Industrial Standardization Act was enacted and promulgated in May 2018. The government has been developing ordinances, etc. based on the amended JIS Act toward its full enforcement on July 1, 2019.

The Growth Strategy 2018 (Cabinet Decision on June 15, 2018) sets forth: “determine an intellectual property promotion plan and promote IP and standardization strategy”. In line with the strategy, METI continues study of desirable ways to form international rules and standardization strategies for advantageous business for Japanese companies as well as desirable public and private collaboration for this purpose.

Specifically, METI has been implementing international standardization regarding smart manufacturing as part of the 2018 program to promote and spread international standardization related to rational use of energy. 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, a system to promote international

standardization activities has been developed in cooperation with National R&D Agencies and private businesses. For human resource development, METI personnel are sent for lectures on standardization at universities and training courses are provided to develop young human resources who will lead international standardization. METI disseminated model curriculums on standardization education for university teachers (faculty development teaching materials) based on the “three action plans to develop human resources for standardization (made public in FY2016)”, and established standardization qualification schemes through the Japanese Standard Association (JSA).

The ministry has been conducting overseas technical cooperation for collaboration with Asian countries in international standardization activities and promotion of their active participation. In FY2018 standardizing organizations and businesses concerned gathered from Japan, China and South Korea 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 (APEC¹).

Based on the Third Recommendations on the direction of a new telecommunications technology strategy (Consultation No. 22 of 2014) of the Telecommunications Council in July 2017 and other recommendations, MIC is promoting standardization activities at standardization organizations including de jure standardization organizations such as the ITU² and standardization forums in the private sector toward international standardization of information communication technologies in the wireless factory, smart home and other priority areas.

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 (ISO/TC282),” “Sludge recovery, recycling, treatment and disposal (ISO/TC275),” “Asset management (ISO/TC224/WG6 and ISO/TC251),” “Stormwater management (ISO/TC224/WG11),” and “Risk management (ISO/TC224/WG).”

(3) Promotion of the Global IP Initiative

Amidst growing economic globalization and open innovation, the JPO is promoting the Global IP Initiative (laid out by the JPO in July 2011) to incrementally improve global IP infrastructure, so that Japanese companies can smoothly engage in business internationally. Currently, the JPO is implementing the “patent prosecution highway (PPH³)” with 42 nations (as of January 2019). This will allow patent applicants whose patents have been deemed patentable to apply for early examination in other countries. As a new effort to contribute to international cooperation in patent examination, the JPO and the U.S.

¹ Asia Pacific Economic Cooperation
² International Telecommunication Union
³ Patent Prosecution Highway

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 technology applications and share the search results and opinions before forwarding the examination results to the patent office of each country. For PCT¹ international application, the PCT Collaborative Search and Examination (PCT CS&E²) was launched on July 1, 2018. Under PCT CS&E, five offices of Japan, the U.S., EU, China and South Korea collaborate 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 regulator 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 Districts

Based on the National Strategic District system and toward realization of the Super City vision aimed at completion of the “future city” that will create a future society using the latest technologies including AI and big data before the rest of the world, the government has established a system to speedily and flexibly make special exceptions to regulations in individual districts and is developing the technical basis toward Society 5.0. The government is also developing bills toward establishment of a regional sand box system for speedy and smooth implementation of demonstration experiments of advanced and innovative near-future technologies including automated driving, unmanned aircraft (drone) and related radio use. Furthermore, the government is working on a system reform that is necessary for more flexible remote drug administration guidance and remote education.

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 maximized, and it has been comprehensively supporting these zones through preferential measures on

¹ Patent Cooperation Treaty

² Patent Cooperation Treaty Collaborative Search and Examination

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.

In this context, The Intellectual Property Strategy Headquarters states, in the IP Promotion Plan 2018, that it will continuously review the current IP system and its operation while paying attention to the technology trends of learned model, AI products, etc., and operational status of the Unfair Competition Prevention Act and the Copyright Act which were amended in 2018, the revised Contract Guidelines on Data Utilization, etc. In order to strengthen the IP strategy for new information properties in response to the rapid expansion of open science, the plan includes: (1) deliberation on development of policies and plans for management and use of data that are research results, and; (2) deliberation on utilization of block chain technology that attracts attention as technology to record transaction history.

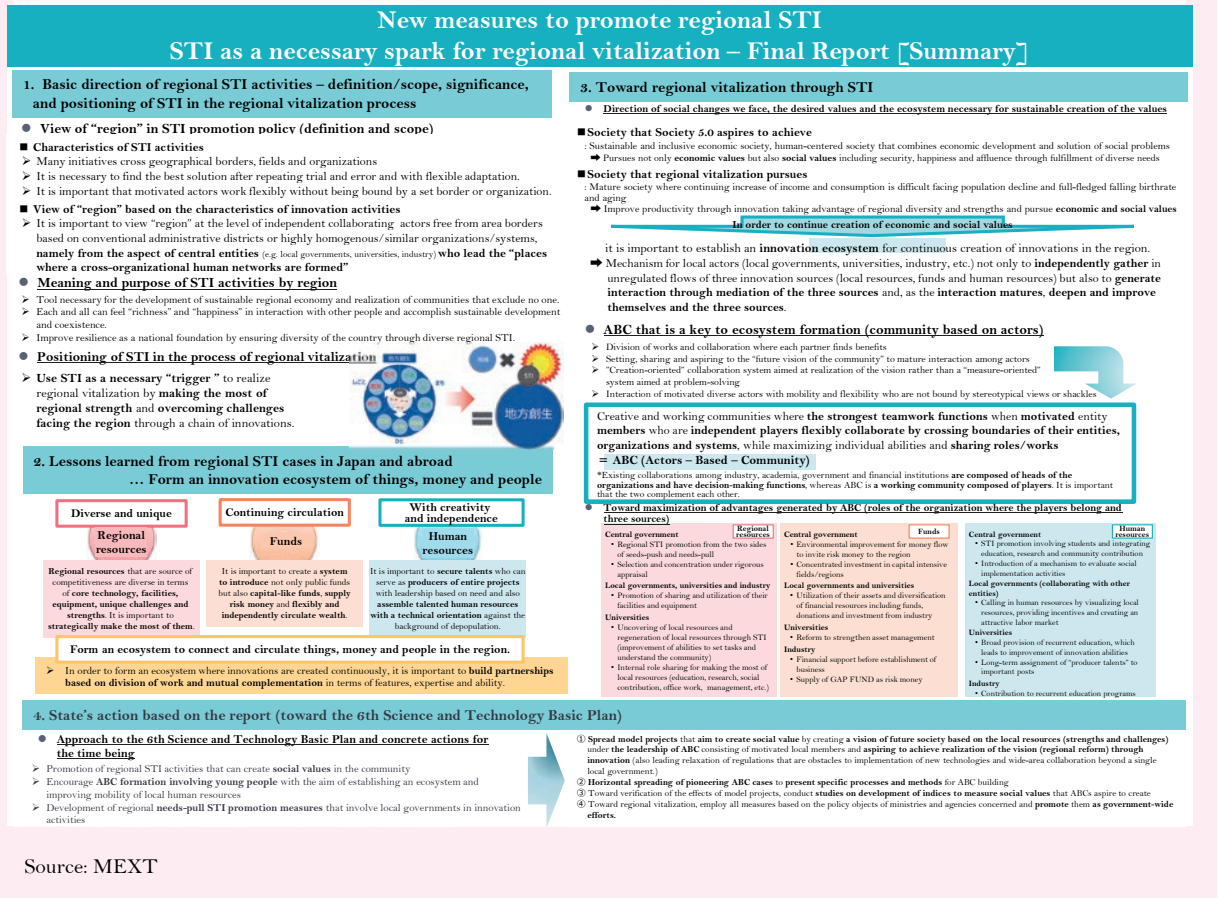
At the committee on the approach to IP system with the 4th industrial revolution in mind, METI studied corporate strategies in response to the 4th industrial revolution and the intellectual property system and operations that support the strategies, and compiled a report in April 2017. For the initiatives that the report found appropriate to be implemented in the future, the government submitted to the 2018 regular diet session “a bill to partially amend the Unfair Competition Prevention Act,” which includes The Unfair Competition Prevention Act, the Industrial Standardization Act and the Patent Act, in order to develop an IP system environment in response to the 4th industrial revolution. The Act was enacted in May of the same year and promulgated on 30th of the same month.

In the face of the expected development of AI-related technologies in various technical fields, it will become important to present how examinations are conducted in an easy-to-understand manner to applicants and other persons who were not familiar with AI-related technologies and to make JPO’s unified judgment on patentability regardless of the technical field. In this context, JPO added examples concerning AI-related technologies to the Examination Handbook for Patent and Utility Model in Japan in January 2019 in order to ensure full understanding by examiners and users in various technical fields.

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. With a view to the next Science and Technology Basic Plan, the “Regional STI Promotion Committee” was set up under the Subcommittee on Industrial Cooperation and Regional Support, Council for Science and Technology to discuss regional STI promotion measures in the future. The committee compiled a report. (Figure 2-5-8).

Figure 2-5-8/ Outline of the final report of the Regional Science Technology Innovation Promotion Committee



- Spread model projects that aim to create social value by creating a vision of future society based on the local resources (strengths and challenges) under the leadership of ABC, motivating local members and aspiring to achieve realization of the vision (regional reform) through innovation (also leading relaxation of regulations that are obstacles to implementation of new technologies and wide-area collaboration beyond a single local government)
- Horizontal spreading of pioneering ABC cases to present specific processes and methods for ABC building
- Toward verification of the effects of model projects, conduct studies on development of indices to measure social values that ABCs aspire to create
- Toward regional vitalization, employ all measures based on the policy objects of ministries and agencies concerned and promote them as government-wide efforts.

Source: MEXT

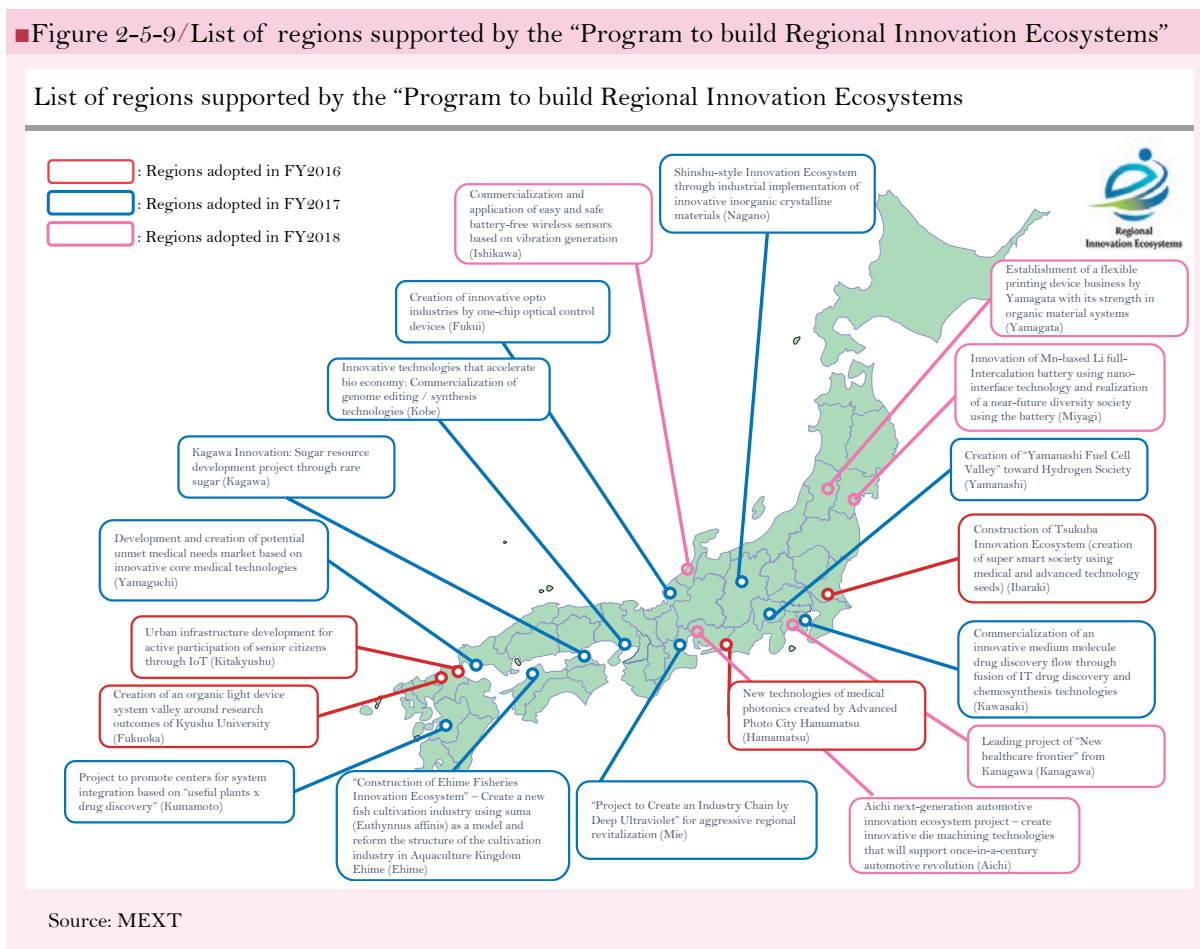
1 Revitalizing regional companies

Toward formation of regional innovation ecosystem and regional revitalization, it is necessary to shift from the stage of quantitative expansion of mechanism building to start innovation to the stage of using regional technology seeds to create successful models with a large social impact with an eye to their global expansion. To this end, MEXT launched the “Program to build regional innovation ecosystems” in FY2016. Under this program, MEXT is supporting commercialization projects with high risk but big social impact by setting up project producing teams in regional universities that are trying to contribute to the growth of the region, gathering human resources and technologies around the source of the regional competitiveness (core technology, etc.) and developing a commercialization plan that can be globally deployed. 19 regions have been adopted in total by FY2018 (Figure 2-5-9).

In order to support prospective core companies of the region in their efforts in new fields/business and facilitate their growth, METI is supporting networking with external nationwide resources (universities, partner companies, financial institutions, etc.) by using human resources for support. For further growth of regional core companies, METI is providing support for formulation of commercialization strategies and cultivation of markets. In cooperation with ministries and agencies concerned, METI established the “Global Network Council” by organizing global coordinators who are experts in commercialization viable in the international markets. The council is supporting development of commercialization strategies and

cultivation of markets with a view to the global market.

■ Figure 2-5-9/List of regions supported by the “Program to build Regional Innovation Ecosystems”



By utilizing the New Market Creation Standardization System, the ministry decided on the standardization of 19 items that had been proposed by well-established businesses as of the end of FY2018. In addition, METI expanded the partner organizations of the Partnership System for Supporting Utilization of Standardization to 159 in 47 prefectures across the country. 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.

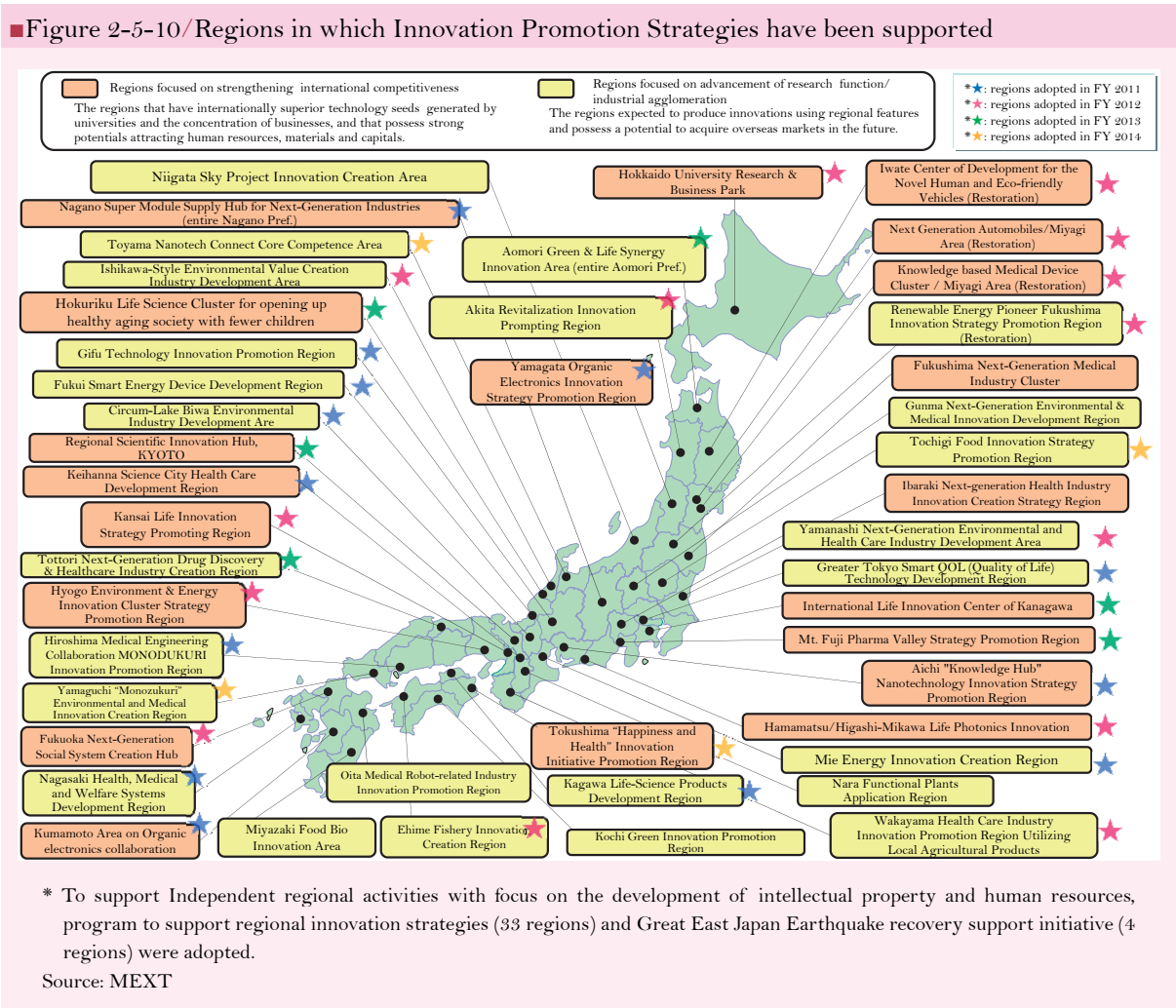
2 Driving innovation systems that make use of local characteristics

(1) Development of a regional innovation system

With the aim of regional innovation, MIC, MEXT, MAFF and METI have been designating certain regions as Innovation Strategy Promotion Regions. These regions are those in which original concepts have arisen through partnerships or other cooperation between local authorities, university research institutes, other research institutes, businesses and financial institutions. MIC, MEXT, MAFF and METI have mobilized policies to establish support systems that target these regions and that provide continuous support, from initial research to commercialization.

As of FY 2018, 45 regions had been selected: 20 Regions Focused on International Competitiveness, in

which local universities have internationally competitive technological seeds, internationally competitive businesses have gathered, and there is a strong potential to attract labor, goods and money from abroad; and 25 Regions Focused on Advancement of Research Function/Industrial Concentration, which are expected to create innovations based on local features and which have the potential to capture overseas markets in future (Figure 2-5-10).



Under the Strategic Information and Communications Research and Development Promotion Program (SCOPE) and based on the 1st and 2nd 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 IoT/BD/AI.

Under the program to build an open innovation platform for the community’s future, MEXT is developing a new platform for creation of regional innovations by creating an environment that encourages local companies to use IoT technologies through support for introduction of IoT equipment to public test laboratories, universities, etc.

For the purpose of expanding regional commercialization functions, the JPO dispatched a Project

Producer to each of three organizations for the period from FY2016 to FY2018. They plan business by identifying latent needs and support creation of an environment for business creation from matching of seeds to business finance and development of markets by constructing and using a regional network including financial institutions.

In order to create innovations in the fields of agriculture, forestry, fisheries and food under “the program to promote research for innovation creation” implemented by NARO 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.

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 127 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, TV interviews in which applicants can participate using their own personal computer through an internet channel, and circuit appeal/trial board for oral proceedings across Japan. Using INPIT¹ Kinki Headquarters (INPIT-KANSAI) 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 and MEXT are making a study on setting inspection indicators so that ministries, agencies and local authorities can understand the situation of Innovation Ecosystem in the regions.

Toward the “goals to be achieved by 2019 with consideration of the characteristics of each prefecture”

¹ National Center for Industrial ProPerty Information and Training

that were set based on the action plan for revitalization of regional IP formulated in September 2016, the JPO provided support for the regions and SMEs and examined the current challenges and future improvements.

■ Table 2-5-11/Key measures for construction of an innovation system that will contribute to Regional Vitalization (FY2018)

Ministry	Implemented by	Project
MAFF	Bio-oriented Technology Research Advancement Institution, NARO	Program to promote research for strengthening of innovation creation

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) is advancing the “Horizon Scanning” initiative. The initiative is aimed at identifying new moves in ST and society (signs of change) that are likely to have a big impact on society in the future through systematic and continued monitoring to find potential opportunities and risks. As part of the efforts, NISTEP has opened the KIDSASHI site that rapidly provides information obtained through Horizon Scanning in the context of uncertainty of future prospect.

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

In order to contribute to strategic technology development in light of the rapidly changing R&D trends including technological innovations and progress of globalization, MAFF is studying R&D trends in other fields and countries, identifying technologies applicable to Japan and analyzing the country’s strengths and weaknesses.

JSPS Overseas Offices collect information on trends in scientific research support efforts by Japanese universities to expand their international bases and activities, collaborate with organizations engaging in science promotion and hold symposiums. In FY2018, JSPS London Office, jointly with the Royal Society of the U.K., held symposia consisting of two fields of “Regenerative Medicine” and “Materials for Energy” to build a momentum for research exchange between the two countries. 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(3), Chapter 7 Section 3).

■ Table 2-5-12/Key measures to capture global needs in the future (FY2018)

Ministry	Implemented by	Project
MAFF	MAFF	Strategic research promotion

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, 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 (SATREPS) program by utilizing Japan's advanced science and technology and Official Development Assistance (ODA). The program promotes international joint research toward addressing global issues and utilization of research outcomes based on the needs of these countries. These projects address issues relating to the environment, energy, bioresources, natural disaster prevention and mitigation, and infectious diseases control. From FY 2008 through FY 2018, 133 SATREPS projects in 50 countries (including 69 projects in Asia and 36 projects in Africa) 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.