

# NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY POLICY

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**Ministry of Education, Culture, Sports, Science and Technology**



## Mission of NISTEP within MEXT

The National Institute of Science and Technology Policy (NISTEP) is a national research institute on science and technology (S&T) policy under the direct jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in accordance with the National Government Organization Act in order to be engaged in the governmental S&T policy planning processes. NISTEP is expected to realize the governmental needs and to collaborate and co-operate with administrative departments such as its participation in the decision-making process.

Accordingly, NISTEP promotes following roles:

**To forecast future policy issues  
and investigate them through  
autonomous research**

**To carry out research in response to  
requests from public agencies**

**To provide data that forms the basis of research  
and play key cooperative and contributing  
roles with other institutions and researchers**

## Major Research Activities

NISTEP carries out research primarily in the following seven areas noted below on the basis of Fifth Science and Technology Basic Plan (the Cabinet decision in January 2016), in order to contribute to the promotion of policy-making process supported by objective evidence-based data along with collaboration with domestic and international universities nationally and internationally and public research institutions.

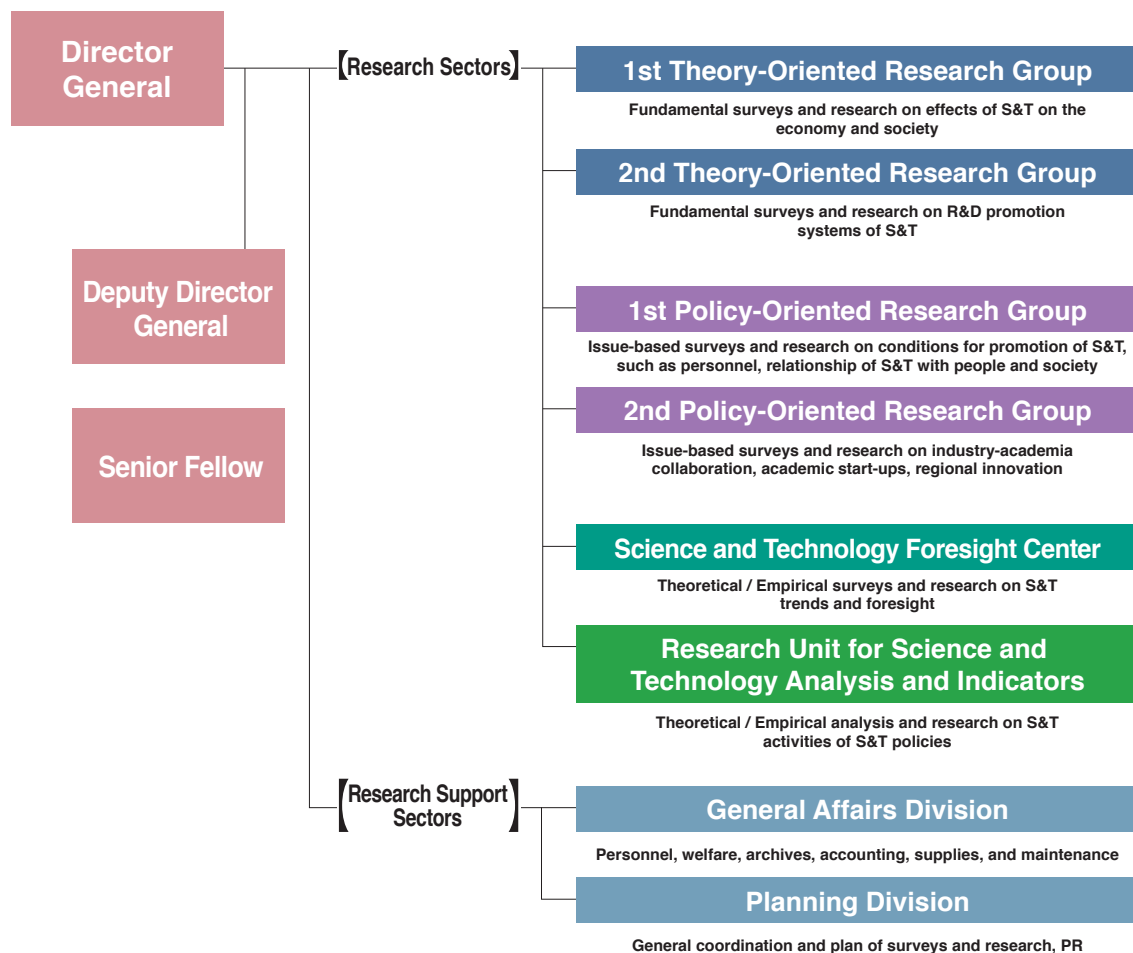
Research results are released through various channels including "NISTEP REPORT" series, "Research Material" series, "Discussion Paper" series, reports to governmental advisory councils as well as lectures and presentations at seminars and international conferences organized by NISTEP, and more.

- ◆ **Science, Technology and Innovation**
- ◆ **University-industry Collaboration and Innovation-related Activities at the Regional Level**
- ◆ **Human Resources in Science and Technology Innovation / The Relationship of Science and Technology with Society**
- ◆ **Science and Technology Indicators, and Scientometrics**
- ◆ **Science and Technology Foresight, and Science and Technology Trends**
- ◆ **Science of Science, Technology and Innovation Policy / Situation Regarding of Science and Technology**

\*See page 3 onward for details on each area.

# Organization, Personnel, and Budget

Prescribed Number of Staff: 44  
 Budget: About 800 million Yen (About 7.3 million US\$)  
 \*As of April 2019



Nominated a senior fellow for institutional cross-sectional works

## History

- Jul 1988** The National Institute of Science and Technology Policy was established (restructured from the National Institute of Resources).
- Jan 2001** The Ministry of Education, Culture, Sports, Science and Technology (MEXT) was formed due to administrative reform. NISTEP became an affiliated research institute of MEXT.  
The Science and Technology Foresight Center was established as a part of NISTEP.
- Jul 2001** Relocated from Common Building for Government Offices at Nagata-cho to the Postal Services Agency Building at Kasumigaseki.
- Jan 2004** Relocated to the Ministry of Education, Culture, Science, and Technology Building (Marunouchi, Chiyoda-ku).
- Apr 2006** The Research Unit for Science and Technology Analysis and Indicators was established.
- Jan 2008** Relocated to the Central Government Building No. 7 East Wing (Kasumigaseki, Chiyoda-ku).
- Jul 2013** Reorganized the structure of NISTEP (Japanese organization name).
- Apr 2016** Reorganized the structure of NISTEP (Group restructuring).

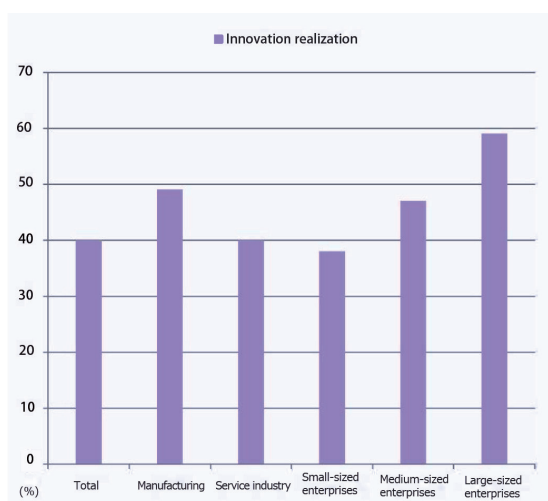
\*July 2018 NISTEP celebrated the 30th anniversary of its establishment

## Science, Technology, and Innovation

It is essential to create economic and social values by generating demands and improving productivity through innovation to realize the sustainable development. NISTEP conducts research and survey regarding situations and trends of innovation activities in firms and national innovation system in order to provide evidences contributing the promotion of science, technology, and innovation (STI) policies.

### ◆ Measurement and analysis of innovation

The Fifth Science and Technology Basic Plan advances the evidence-based policy making, evaluation, and review. NISTEP conducts a statistical survey based on the international standards to measure situations and trends of innovation and innovation activities in firms. It also analyzes the economic impacts of academic research on industries through knowledge flows by linking data in firm and institutional levels with bibliographic proceeds information of patents and academic papers etc. Through those researches and surveys, NISTEP proceeds the better understanding of national innovation system and innovation processes which underpins STI policy making, and develops of innovation measurement.



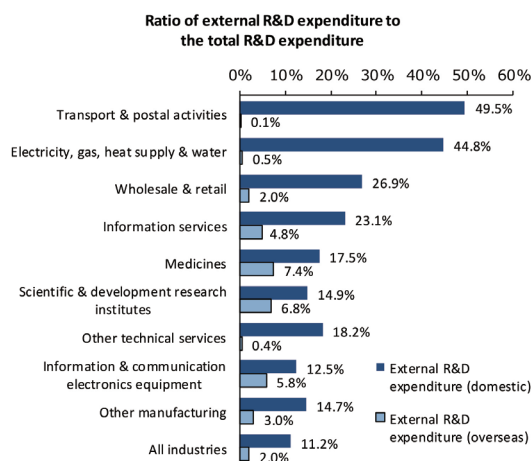
Ratios of innovating firms to all firms: by industry (manufacturing and services) and by enterprise size class

The figure shows the ratios of the firms realizing product, process, organisational, or marketing innovation in the reference period from FY2012 to FY2014.

(Source: "Report on the Fourth Round of the Japanese National Innovation Survey (J-NIS 2015)," NISTEP REPORT, No.170 (2016).)

### ◆ R&D in firms

"Survey on Research Activities of Private Corporations", which NISTEP continuously conducts on a large scale, is the statistical survey approved by the Minister for Internal Affairs and Communications as General Statistical Surveys under the Statistics Act. These highly trustful survey results are utilized for planning Japan's science technology and innovation policy.



(Source: "Survey on Research Activities of Private Corporations 2017," NISTEP REPORT, No.177 (2018))

# University-industry Collaboration and Innovation-related Activities at the Regional Level

## ◆ University-industry collaboration and university startups

In order to revitalize innovation in Japan, promotion of university-industry collaboration and open innovation are significant to make use of new ideas, knowledge, and techniques inside/outside of the organization.

Regarding university-industry collaboration, various policies including the formulation of support system within universities have been decided by the government. By use of those policies, innovation is promoted in many universities. For promoting these efforts effectively, NISTEP conducts survey and research on the current situations and issues of industry-academia-government cooperation, and accumulates various data.

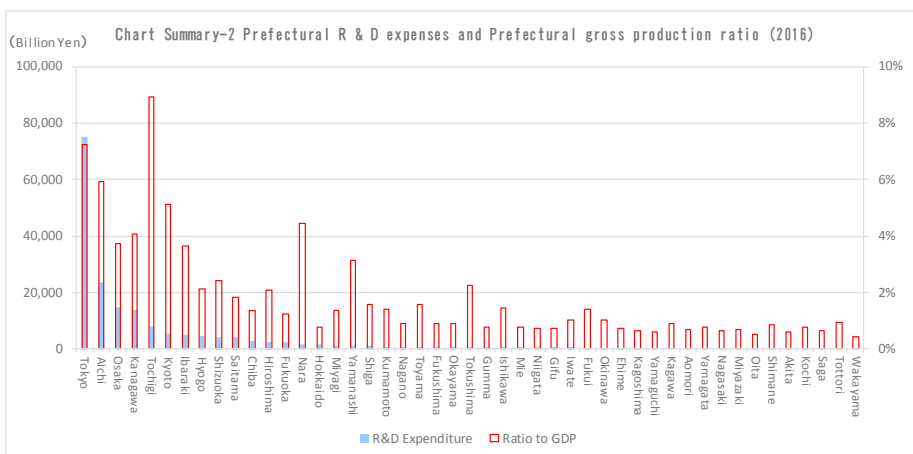
### Management of large-scale university-industry collaboration with more than disbursements 10 million yen from firms

<b>Open Innovation</b>	•Companies are oriented toward collaborative research on university-industry collaboration to develop technologies that are not in-house, and expectations for university seeds will also increase due to the necessity for companies to engage in open innovation.
<b>Scale expansion of scale of collaborative research</b>	•When scale expansion of existing university-industry collaborative research, it was observed that firms tended to emphasize application and develop research.
<b>Increase in large-scale collaborative research</b>	•It is necessary not only to simply use the increase in the number of collaborative research as an indicator, but also to consider the organizational management efforts of the university, including a performance system to increase the accuracy of creating collaborative research outcomes.
<b>Matching Fund</b>	•Matching funds have an effect on increasing the scale of university-industry collaborative research, and it is effective to invest as a catalyst in places where there is a risk that it is difficult for the companies to hand out.

University startups are 'vehicles' for innovation using research results conducted by universities and public research institutes. Based on the importance of university startups, NISTEP carries out survey and research on 1) the establishment and growth of university startups, and 2) the mechanism to promote university-industry collaboration mediated by intellectual properties from the research. The goal of this study is to clarify the current situation and issues towards future promotion. In particular, NISTEP defines R&D oriented university startups as "university startups that are applying a patent after establishment" in a narrow sense, and finds those R&D oriented university startups, continuously grasps their actual state, and analyzes their growth factors with relevant research organizations.

## ◆ Innovation-related activities at the regional level

It is considered that excellence in science and technology activities and innovation-related activities at the regional level are the basis of advancement, diversification, and competitiveness of S&T in the national level. Under such circumstances, NISTEP conducts survey researches on regional S&T indicators and on the causal relationship for regional innovation, in order to create autonomous and sustainable innovation systems in the region.



(Source: "Regional Science and Technology Indicators 2018 "NISTEP RESEARCH MATERIAL, No. 278 (2018))

# Human Resources in Science, Technology and Innovation

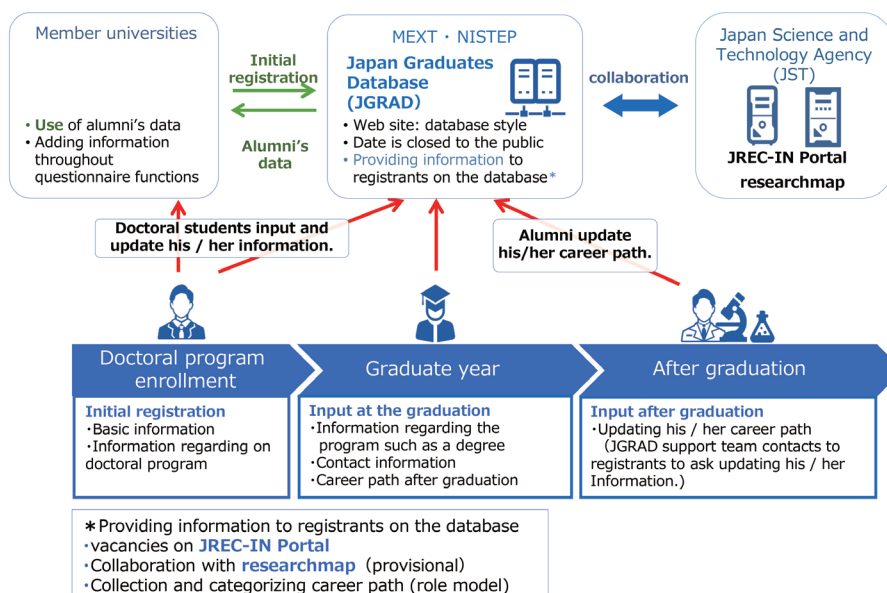
## ◆ Research on STI personnel carrier path

To overcome these challenges, NISTEP conducts doctoral human resources profiling survey (JD-Pro.), and also develops and operates the Doctorial Human Resources DB (JGRAD), as information base to keep track on profiles and career paths of doctoral graduates.

## ◆ Survey on Postdoctoral Fellows Regarding Employment and Careers

NISTEP surveys employment and carrier path of postdoctoral fellows at universities and public research institutes in Japan. The aim of this survey is to provide data making policies on training and encouraging postdoctoral fellows. Conducted by MEXT to universities and public research institutes every three year, this survey is nominated as the research activity approved by the Minister for Internal Affairs and Communications as General Statistical Surveys under the Statistics Act, and NISTEP initiatively participates in collecting and analyzing data. Many governmental committees use research outputs, for example, for making Science, Technology, and Innovation policy.

### Outline: Japan Graduates Database (JGRAD)



## ◆ Research on diversity and mobility of S&T personnel

NISTEP tries to obtain and analyzes quantifiable data on mobility, movement, and diversity of S&T personnel, and conducts international flow of human resources on STI as well as theoretical and empirical research on innovation in Japan.

# The Relationship of Science and Technology with Society

The perspectives of users with diverse values have become essential to create innovation. Additionally, the basic premise for Science and Technology (S&T) must gain social understanding, trust, and support to meet social expectations. Thus, we will engage and collaborate with the various stakeholders in society by dialogue to promote Science, Technology, and Innovation (STI) activities, that is, requirement of deepening the relationship to promote "Co-operation". Based on these, NISTEP conducts survey and research on S&T literacy as well as grasping public attitudes to S&T. It also mainly participated in "public opinion poll on S&T and society" by the Cabinet Office in November 2017.

# Science and Technology Indicators, and Scientometrics

Quantitative S&T data and their analyses are an indispensable foundation formulating S&T policy, and they play an important role in S&T policy research; The quantitative data represents a key tool in grasping S&T activities that tend to be complex and reach across multiple fields, as well as in analyzing the effects and influences that policies have. Given that S&T activities are the process of producing knowledge, preparing quantitative data for this intangible process is not easy. In addition to this, close linkage to S&T activities with various other activities makes the measurement of S&T activities and differentiating it from other activities technically difficult. NISTEP confronts the difficulties here, and that is why we are developing S&T indicators and conducting research in scientometrics in order to deepen application and analysis of quantitative S&T data.

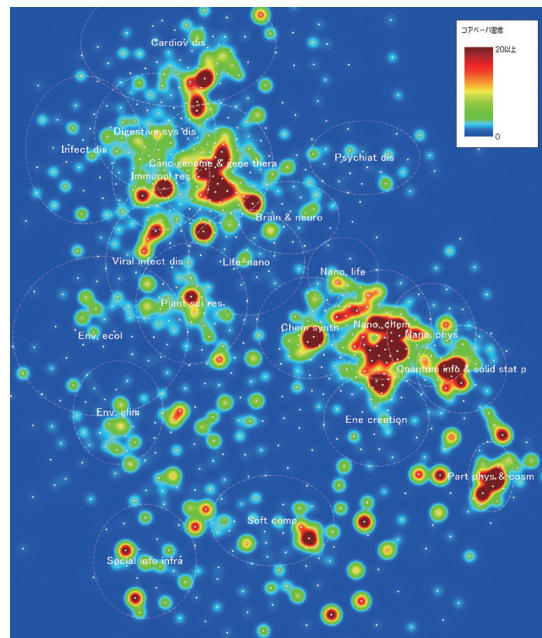
## ◆ Science and Technology Indicators

Science and Technology Indicators are basic resources for systematically ascertaining and observing S&T activities not only in Japan, but major countries based on objective, and quantitative data. It classifies science and technology activities into five categories: R&D Expenditure, R&D Personnel, Higher Education and S&T personnel, Output of R&D, and Science, Technology, and Innovation. We show the state of Japanese science and technology activities with approximately 160 indicators. The report is published annually and shows the latest results of analyses of scientific publications and patent applications conducted by NISTEP.



## ◆ Scientometrics

With the aim of gaining a comprehensive and quantitative understanding of views on sciences and technology trends, we analyze research, development trends and the S&T level of each country, using a database comprising scientific papers (e.g., chronological series analysis of scientific strengths and weaknesses in each country, and institutional level analysis that reveals their characteristics). In addition, we make a “Science Map” every other year in order to identify hot research areas in science and analyze their characteristics.



Science Map

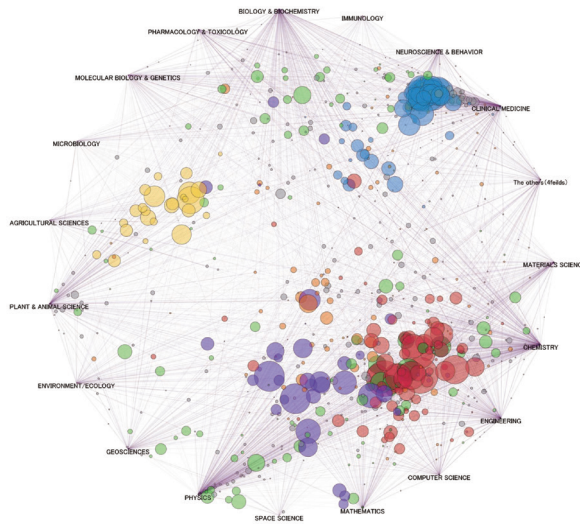
### How to Read the Science Map

White circles indicate the centers of research areas. The core-paper density can be depicted as color around the centers; Red areas show the higher density, while blue areas signify the lower density. This map shows the close relationship between clinical research and basic life science, and explains that nano-science is positioned in between chemistry and physics.

(Source: “Science Map 2016” NISTEP REPORT No. 178 (2018.10))

## ◆ Benchmarks of Scientific Research and Research Capability of Japanese Universities

Since 2008, NISTEP, focusing on scientific papers, has biannually been conducting benchmarking scientific researches in Japan and major countries, and analyzing the scientific paper production structure of sector / organization level. In addition, through the benchmarking individual universities in Japan, NISTEP understands the scientific fields in which each university has its strength and analyzes the status of scientific paper production of the university in the internal organization level.



### Sub-Organization Level Mapping of the Research Activities of University

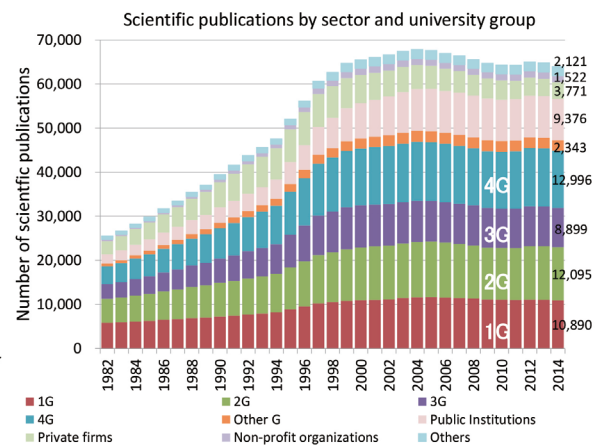
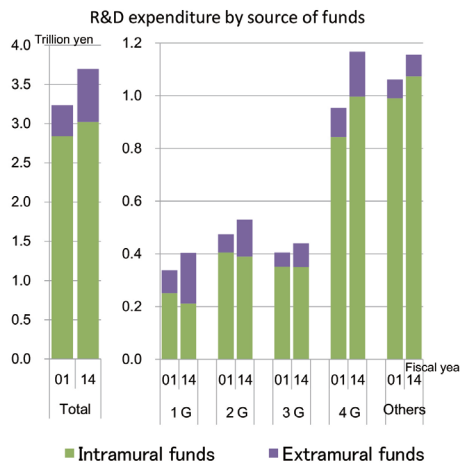
This is the result of university sub-organization mapping based on the balance of the field of science in scientific papers (900 Sub-Organization in 31 universities). The size of each circle represents the number of scientific papers in each sub-organization; the position of each circle is determined by the field balance of scientific papers.

(Source: "Structure Understanding of the Research Activities of University Sub-Organization Level Using Bibliometric Analysis," NISTEP RESEARCH MATERIAL, No.258 (2017))

## ◆ Input / output structure of Japanese university system

Universities play a main role to produce scientific knowledge in Japan. To make policies regarding this matter, it is required to understand situation of scientific research in Japanese universities from viewpoints of both inputs and outputs. NISTEP thus categorizes universities into 4 groups, and conducts structural analyses of inputs (R&D expenditure, researcher) / outputs (scientific papers) of each group.

Structure of scientific papers' production by the field of science and university group in Japan: It is categorized Japanese universities into 4 university groups, in accordance with scientific papers' share (natural science).



(Source: "Output Structure of the University System in Japan: In-depth Analysis of the Scientific Papers by the University Group," NISTEP RESEARCH MATERIAL No.271 (2018))



# Science and Technology Foresight, and Science and Technology Trends

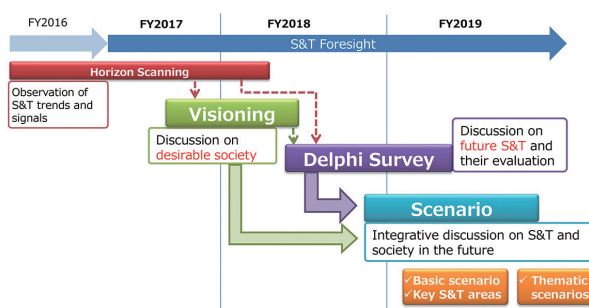
Policy discussion promoting STI requires science and technology foresight to envision the future society through grasping new S&T movements on a regular basis. NISTEP seeks to develop new S&T foresight methodologies in order to design the scenario for the future. Supporting fundamental foresight activities, NISTEP also conducts the following tasks: information collection, analyses, formulation of visualized platform using ICT, and examination in open science that enables large influence on scientific studies and on the relationship between S&T and society.

## ◆ Science and Technology Foresight Report and Horizon Scanning

NISTEP's S&T foresight is characterized by long term horizon of next 30 years, and by wide range of discussions with various stakeholders from different fields such as experts from S&T and those from demand sides and from social sciences and humanities. Combining various methods, NISTEP tries continuously to draw an ideal society and to identify S&T that should contribute to realize the society. In addition, NISTEP makes challenges to establish new methodologies and in depth analyses over case studies.

NISTEP also conducts continuous and systematic horizon scanning in order to observe S&T developments and signals from social changes due to developments. NISTEP sets up a web media called KIDSASHI and provides signals including some uncertain information by exploring and analyzing new trends through quantitative and qualitative approaches.

Process of the 11th Science and Technology Foresight



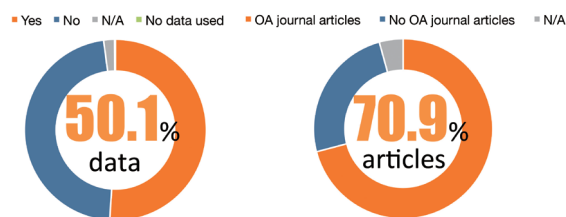
(Source: "A Survey on Open Research Data and Open Access", RESEARCH MATERIAL, No.268 (2018))

## ◆ Basic activities and open science: supports for foresight activities

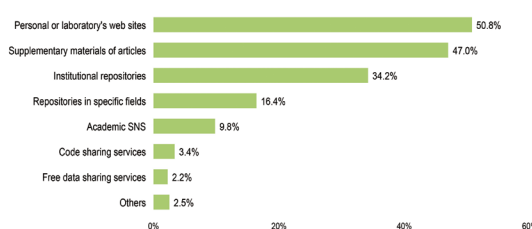
NISTEP builds up and operates platforms of S&T information collection, analyses, and visualization in order to support foresight activities. NISTEP conducts these activities through a network of 2,000 experts using ICT and automatically S&T information collection (scientific papers, press releases, policy information, etc.). Outputs are used not only for foresight activities, but also planning targeted academic fields of research grants.

Furthermore, NISTEP conducts surveys on research data sharing and cooperates with other domestic and/or overseas institutes regarding open science that enables large influence on scientific research activities and on the new relationship between S&T and society.

Open Research Data and OA journal articles (n=1,398)



How to publish Data (n=713)



(Source: "A Survey on Open Research Data and Open Access", RESEARCH MATERIAL, No.268 (2018))

## Science of Science, Technology and Innovation Policy

There is growing public expectation from S&T as a means of addressing the various changes in economy and society and resolving today's most pressing social issues. This kind of policy formation requires a highly rational and transparent process based on objective evidence. NISTEP is committed to develop data infrastructure to contribute to Science, Technology, and Innovation (STI) policy.

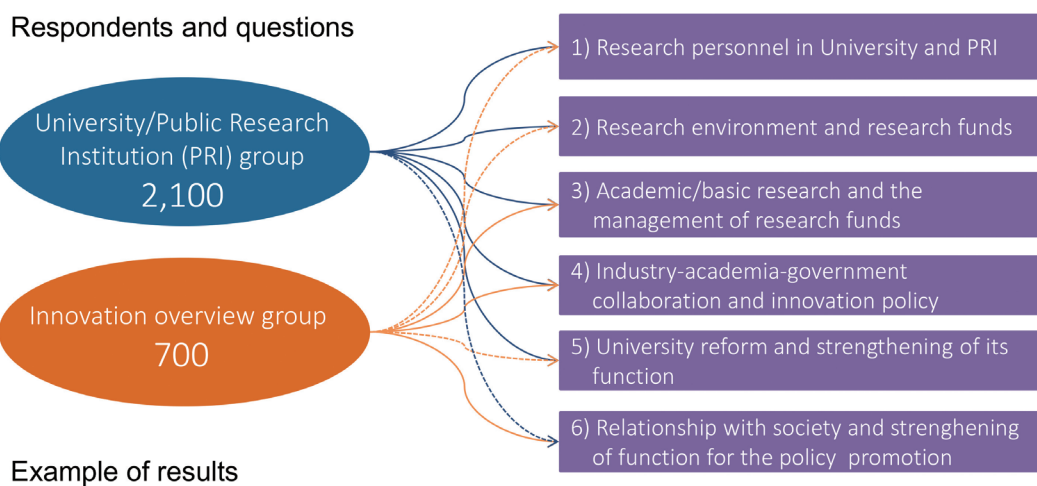
The United States, Europe, and other countries are promoting research to scientifically analyze the mechanisms of STI and taking actions to build data-infrastructure that will be based on their policymaking. For its part, Japan currently advocates "Science of science, technology and innovation policy" as a new field that will provide a foundation for a transition from conventional S&T policy to STI policy that encompasses other related policies.

Based on this background, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) launched the "Science for RE-designing Science, Technology and Innovation Policy (SciREX)" program in FY 2011 to realize "evidence-based policy formulation" that will create effective policies addressing pertinent issues based on analysis and full understanding of economic and social circumstances from multifaceted perspectives.

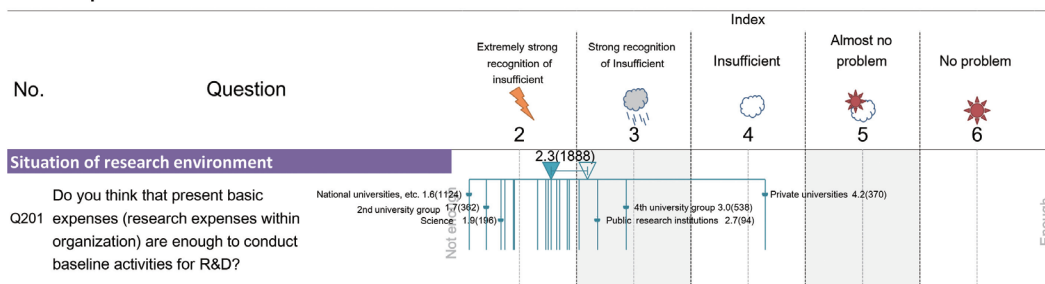
NISTEP takes charge of promoting the development of useful data-infrastructure for research or analysis in the area of Science, Technology, and Innovation policy formulation.

## Situation regarding of Science and Technology

Since FY 2016, NISTEP has been conducting a 5-year-term and continuous survey, NISTEP TEITEN survey, to about 2,800 Japanese experts and leading researchers in universities, public research institutions, and private firms in order to track the situation and trends of STI system in Japan during the Fifth Science and Technology Basic Plan (the Cabinet decision in January 2016).



### Example of results



(Source: Analytical Report for NISTEP Expert Survey on Japanese S&T and Innovation System 2018 (NISTEP TEITEN survey 2018), NISTEP REPORT, No.179 (2019))

## Issue of information on research results

NISTEP also provides the following information to the public.

### ◆ NISTEP Newsletters

The NISTEP Newsletter (Japanese onry) began in February 2011 for introducing our activities.

### ◆ STI Horizon

“STI Horizon” features valuable information on various researches by sensing very small social changes and weak signals of technological innovation. It also covers industry-academia collaboration, academic start-ups, and human resources. In addition, it aims to establish a new media to meet recent trends of web publishing and communication by creating new editing systems to promptly publish on-line, collaborating with social media, and introducing the data publishing function to support relevant discussions of articles.

### ◆ Review Seminar

Every December, NISTEP presents its various research outputs to the public including universities, firms, and governmental agencies. The goal of review seminar is that more people get interested in NISTEP's research activities.

## NISTEP Selection (The Researchers with Nice Step)

Since 2005, NISTEP has been selecting the researchers who made outstanding contributions to S&T as “NISTEP Selection (The Researchers with Nice Step)”.

NISTEP holds symposia which present their cutting-edge research achievements and initiatives that advance science and technology.



2018 winners visited the Minister of Education, Culture, Sports, Science and Technology

## Collaboration and cooperation with other institutions

NISTEP holds agreements with policy research institutions and universities in Japan and overseas to conduct joint research, and personel exchanges, and to invite leading researchers for symposia.

In addition, NISTEP holds personel trainings, inviting junior government officers from emerging economies in charge of S&T policy for enhancing international collaboration in the future.



NISTEP expands its international activities such as the Trilateral S&T Policy Seminars with governmental think tanks in China and Korea.

[List of collaborative institutes and universities]

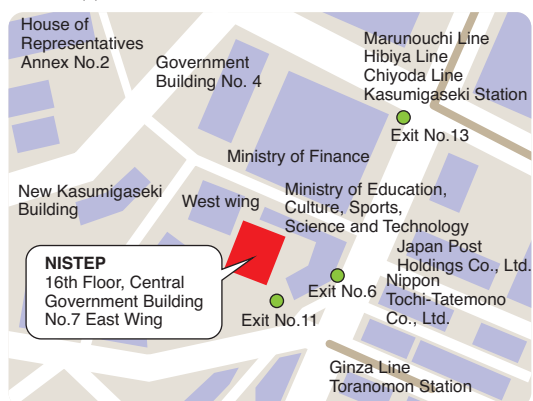
○National Graduate Institute for Policy Studies (GRIPS)

○Japan Science and Technology Agency (JST)

○Overseas policy research institutions (China, Egypt, EU, Finland, France, Germany, Korea, Russia, Turkey, UK, USA, etc)

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Tokyo Metro Chiyoda Line/Hibiya Line/Marunouchi Line: Get off at Kasumigaseki Station, Exit A13 (5-minute walk)

WEB <http://www.nistep.go.jp/en/>

