

# NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY POLICY

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



## Mission of NISTEP

The National Institute of Science and Technology Policy (NISTEP) is a national research institution that was established in accordance with the National Government Organization Law under the direct jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to be engaged in the Japanese government's science and technology policy-planning process. It is expected to ascertain government needs to collaborate and cooperate with government agencies, including participation in the decision-making process. Accordingly, NISTEP takes on the following three missions:

**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

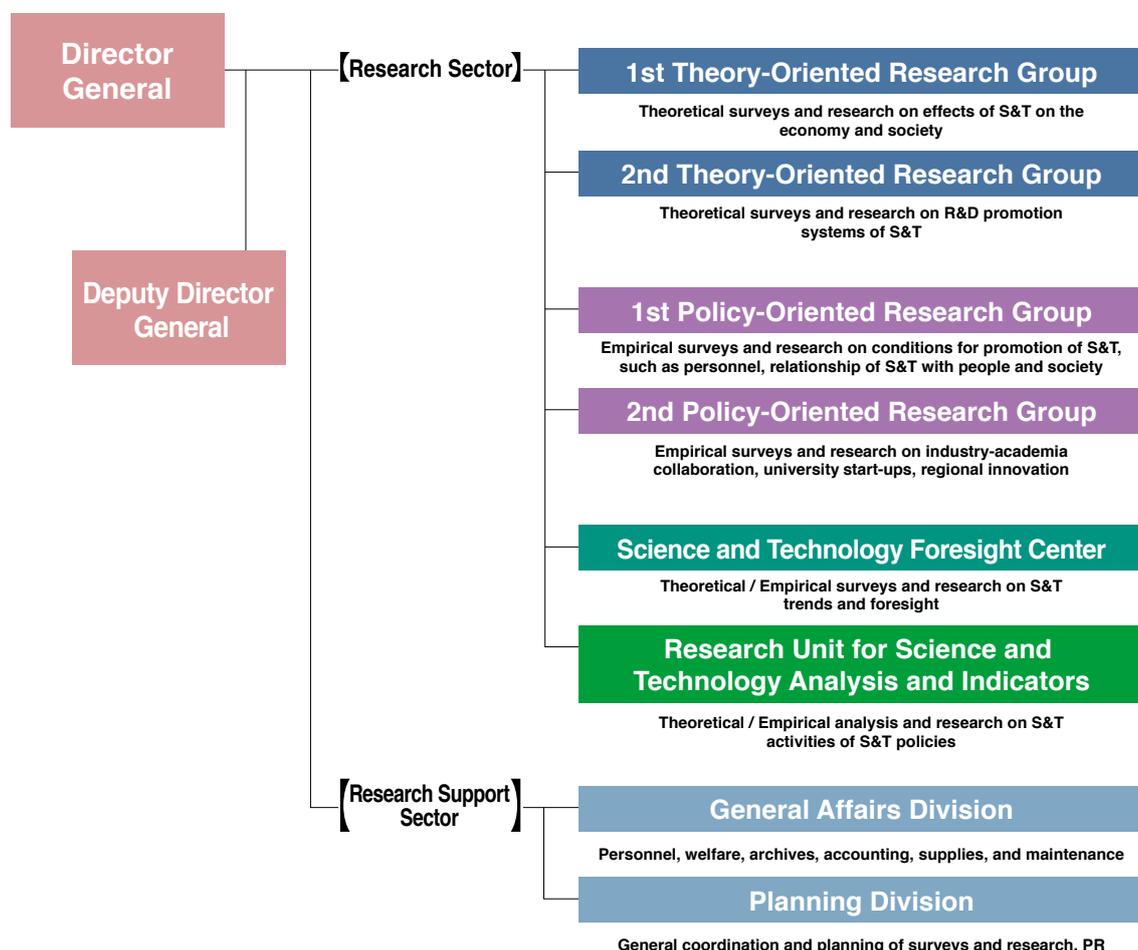
NISTEP, based upon the 5th Science and Technology Basic Plan, carries out research primarily in the seven areas noted below, in order to contribute to the promotion of policy-making process, supported by objective evidence-based data, along with collaborating with domestic and foreign universities and public research institutions. Research results are released through a variety of channels, including the "NISTEP REPORT", "Research Material", "Discussion Paper", as well as at seminars and international conferences organized by NISTEP, and more.

- ◆ **R&D and Innovation**
- ◆ **Science and Technology System**
- ◆ **Human Resources in Science and Technology**
- ◆ **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**

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

# Organization and Personnel

Staff: 45 Staffs \*As of April, 2017



## History

- Jul 1988** National Institute of Science and Technology Policy established (restructured from the National Institute of Resources).
- Jan 2001** Ministry of Education, Culture, Sports, Science and Technology (MEXT) formed due to administrative reform. NISTEP became an affiliated research institute under MEXT. The Science and Technology Foresight Center was founded as a part of NISTEP.
- July 2002** Relocated from common building for government offices at Nagata-chou to postal services agency government building at Kasumigaseki
- Jan 2004** Relocated to the Ministry of Education, Culture, Science, and Technology Building (Marunouchi, Chiyoda-ku).
- Apr 2006** 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) Satellite office established at the National Graduate Institute for Policy Studies (GRIPS).
- July 2013** Reorganized the structure of NISTEP (Japanese organization name)
- Apr 2016** Reorganized the structure of NISTEP (Group restructuring)
- Jan 2018** Integrate satellite office into 2nd Theory-Oriented Research Group.

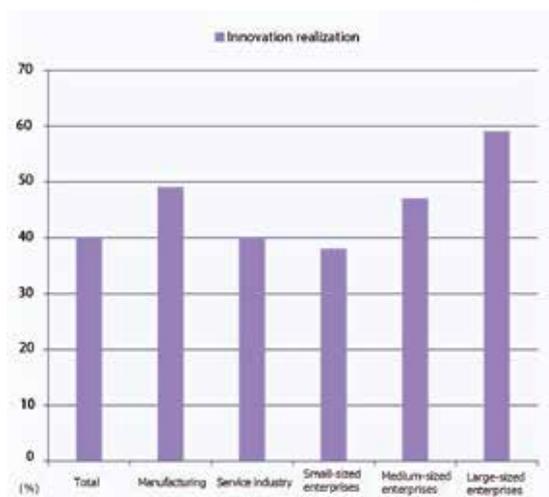
## R&D and Innovation

In order to ensure future growth and development in Japan, innovation is critically important. NISTEP is working on clarifying the process of realization of innovation by tracking how knowledge—created through tangible and intangible asset investment including R&D—leads to innovation. This research covers activities not only at universities and public research institutions but also at private companies.

### Innovation and intangible assets

Improving productivity through innovation is considered key to Japan's future sustained growth. To achieve the innovation, Japan as a developed country needs to invest in intangible assets. Using an economic approach, NISTEP seeks to clarify the process leading to greater productivity through innovation—created by investment in intangible assets. Specifically, NISTEP conducts the National Innovation Survey of official statistics. This survey is designed to collect data on innovation activities in firms. NISTEP also builds a database on intangible assets, innovation, and productivity, using data in Japan and other countries, including official statistics, and conducts empirical analyses with the databases. In addition, in order to facilitate our research projects, we collaborate with domestic and foreign institutions including the Organization for Economic Cooperation and Development (OECD), Hitotsubashi University, the Research Institute of Economy, Trade, and Industry (RIETI), and more.

The ratio of companies with innovation realization (among surveyed companies) by manufacturing and service sectors, and the size: %



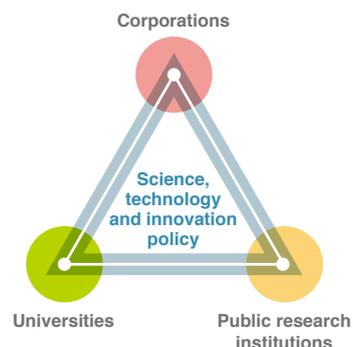
This graph shows that 40% of surveyed companies (152,939) have answered as realizing at least one of the innovation types; product innovation, process innovation, organization innovation, or market innovation.

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

### R&D activities and management

The process of innovation is developed through collaboration between companies and the government, universities, and public research institutions. In order to formulate and implement science, technology and innovation policy with a view to creating innovation, it is important to accurately assess trends in R&D activities and management amongst not only government, universities, and public research institutions, but also private companies, which spend approximately 70% of total R&D expenditure in Japan.

In order to accurately assess research trends of private companies, NISTEP conducts "Survey on Research Activities of Private Corporations" of official statistics. In addition, NISTEP conducts research on internationalization/industry-academia collaboration of research activities at private companies, as well as intellectual asset management. NISTEP also conducts surveys on research management of university and public research institution.

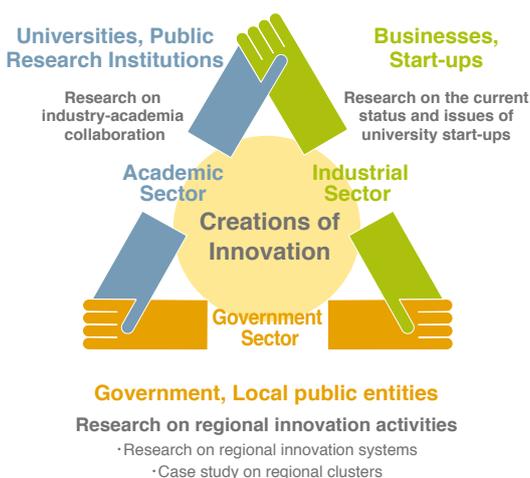


# Science and Technology System

Realizing Science, technology, and Innovation requires the building of appropriate systems and mechanisms. NISTEP strives to contribute to the formulation of policies and measures concerning S&T systems by surveying and analyzing relevant circumstances in Japan and abroad. Such surveys and analyses cover innovation activities at the regional level and industry-academia collaboration as well as other various systems and initiatives.

## Industry-academia collaboration and academic startups

Policies of industry-university collaboration in Japan had fully expanded by the inclusion of "promotion of HR exchanges among industry, academia, and government" in the 1st Science and Technology Basic Plan of 1996. After that, systems to promote technology transfers from universities had been developing, along with the enactment of the Technology Licensing Organization Law of 1998, and the Industrial Revitalization Act including Japanese version of the Bayh–Dole Act of 1999. In addition, policies to facilitate a commercialization of science and technology had been actively introduced, such as incorporation of national universities and establishment of R&D Revival Measures Law. Also, as the concept of open innovation is suggested in recent years, it becomes critical for private enterprises to have external collaborations acquiring valuable out-house information, due to the difficulty of creating own knowledge and technology by in-house efforts. In order to affectedly promote such efforts, NISTEP conducts theoretical and empirical researches on the systems of industry-academic collaboration to precipitate the creation of university-based venture companies, and the utilization of intellectual property as a society, and also on innovation and international mobility of science and technology innovation human resources.



## 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 is the basis of advancement, diversification and competitiveness of S&T at the national level. For this reason, NISTEP conducts surveys and research on systems and measures concerning S&T promotion at the regional level, as well as on success-inducing factors and promotion policies for regional innovation systems.

Under such circumstances, NISTEP conduct survey researches on regional science and technology indicator, and on the causal relationship for regional innovation, in order to create autonomous and sustainable innovation systems in the region.

## R&D systems and S&T systems

NISTEP conducts surveys and research to identify the ideal R&D systems and S&T systems needed to realize STI in Japan based on comparisons with other countries. It also implements research on the desirable institutions and systems by analyzing changes in experts' attitudes concerning them through questionnaires that are issued in identical form to the same respondents each year (Analytical Report for NISTEP Expert Survey on Japanese S&T and Innovation System).

## Human Resources in Science and Technology

Along with the increased sophistication and complexity of S&T, which forms the very basis of daily life and the foundations for our society, the work of science and technology personnel is becoming increasingly important. In order for Japan to continuously produce results in the field of S&T—and to foster new innovation—universities, public research institutions, and companies of various sectors need to put more resources into training personnel capable of leading Japan and the world. It is therefore critical to create an environment where individuals can develop this capacity.

At the same time, in order to train S&T personnel capable of working on future initiatives, we need not only to survey systems and career paths, but also to accurately assess issues and problems related to job site conditions and career development, and to assist individuals in resolution of such issues. In light of these circumstances, NISTEP works to analyze issues faced by personnel working in the field of science and technological innovation.

### ◆ Research on training S&T personnel

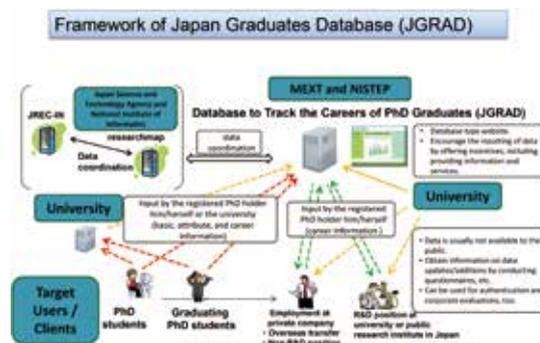
Japanese universities and graduate schools have employed distinctive systems to train personnel through high-quality education and research and to make education more systematic.

At NISTEP, one of our objectives is to assess the level and circumstance of trained personnel and to shed light on current and future issues. This is accomplished by examining education, research, and personnel development in Japanese graduate schools mainly at the doctoral level, and by comparing systems at universities around the world with Japanese university systems.

### ◆ Research on S&T personnel career paths

Producing doctors who deal with globalized issues and industrial requirements is anticipating for graduate school education in Japan. However, there is limited information on career paths of students after completion of doctoral studies, and a system assessing the activities of doctoral human resources in the society is not developed yet.

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



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

In order to ensure that S&T personnel in Japan can carry out superior research, it is important to boost mobility of researchers between institutions so that they can compete with each other to develop.

In addition, diversification of personnel, such as employing female researchers and foreign researchers, is expected to contribute to superior results. NISTEP tries to obtain quantifiable data on mobility, movement, and diversity of S&T personnel, and analyze this data.

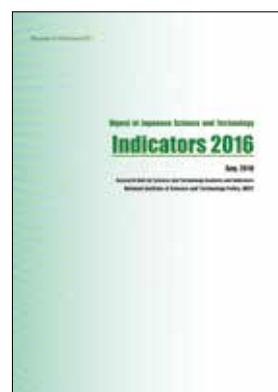


# Science and Technology Indicators, and Scientometrics

Quantitative S&T data and their analyses are an indispensable foundation for formulating S&T policy, and they play an important role in S&T policy research. Quantitative data represent 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 activity is the process of producing knowledge, preparing quantitative data for this intangible process is not easy. In addition to this, close linkage to S&T activity with various other activities makes the measurement of S&T activity and differentiating it from other activities technically difficult. NISTEP understands the difficulties here, and that is why it is 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 S&T activities in Japan and the world based on objective, quantitative data. Science and technology indicators are prepared by many countries of the world. In Japan, the first indicators were published by NISTEP in 1991. Initially, NISTEP reviewed the structures of indicator system every three years. However, since 2009, it has been emphasizing the timeliness of data by focusing on basic indicators that are updated each year. It assembles basic data that include R&D expenditure, number of researchers, and number of published research papers in Japan and major countries together with detailed explanations about meta-data of the statistics. Moreover, NISTEP not only announces “science and technology indicators” but also conducts relevant surveys and research.



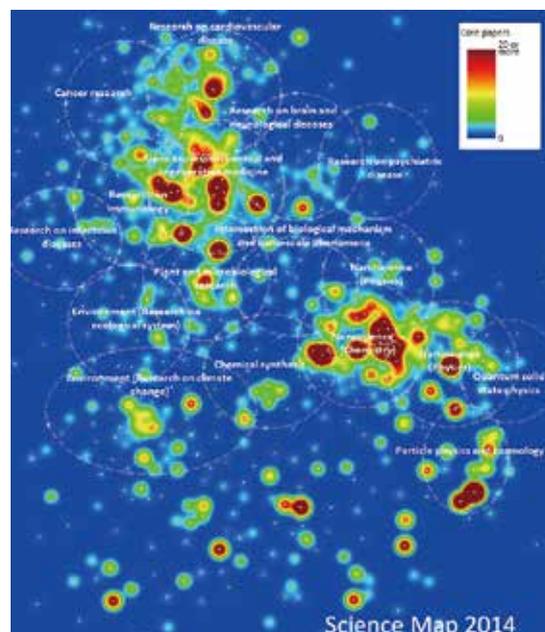
## Scientometrics

With the aim of gaining a comprehensive and quantitative understanding of views on sciences and technology trends, we analyze research and development trends and the science and technology level of each country using a database comprising scientific papers (e.g., time series analysis of scientific strengths and weaknesses in each country, and an institution 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.

### 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 also explains that nano-science is positioned in between chemistry and physics.

Source: NISTEP REPORT No. 169 Science Map 2014



Science Map

# Science and Technology Foresight, and Science and Technology Trends

Policy discussion for 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. We also keep up on S&T trends of both fundamental researches and social implementation that are emerging throughout the world with cooperation from external experts, which are published regularly.

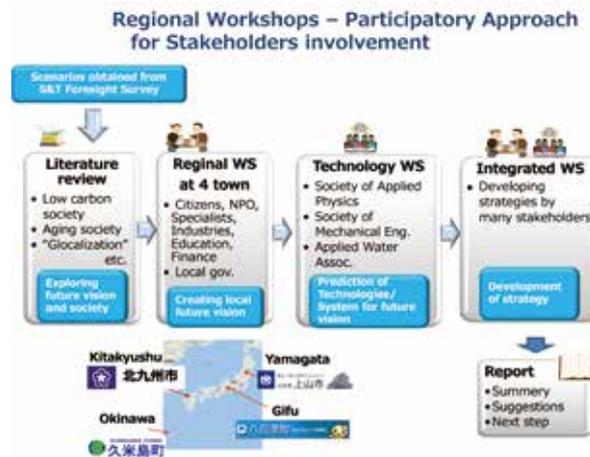
## Science and Technology Foresight Reports

Large-scale S&T foresight has been implemented roughly every five years since 1971 in Japan. As of the fifth survey (1992), NISTEP has taken over as the implementing body.

NISTEP's S&T foresight is characterized by long-term horizon of 30 years and broad discussion, taking the perspective not only of scientists and technological experts but also of the demand side and experts in humanities and social science. NISTEP combine various methods including Delphi questionnaire, scenario and workshops to paint a picture of the desirable society and then identify S&T that can contribute to its realization.

In addition, we start to develop new foresight methodologies including horizon scanning, with a purpose of capturing new signs of S&T development and social changes.

We have enhanced our international network of foresight activities through participating in international projects and organizing workshops for researchers abroad. We are leading in this regards.



## S&T trends

NISTEP conducts survey analyses of 1) orientation of R&D in each area, from fundamental to applied, and its development and impacts on society, 2) potential R&D topics in the future, current conditions and issues in S&T systems, with cooperation from external experts, including members of the S&T Experts Network. In addition, NISTEP regularly publishes "STI Horizon" to timely address very small social changes and weak signals of technological innovations, and to provide the applications of foresight activities.



STI Horizon 2015. Vol.3 No.1

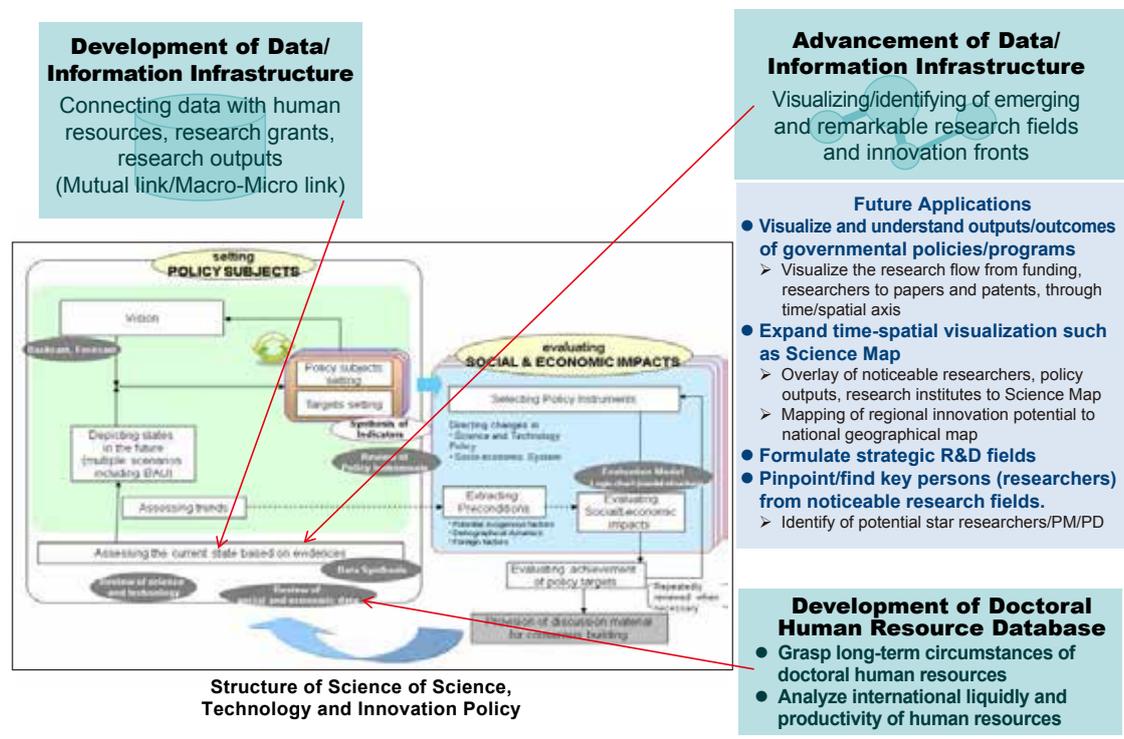
# Science of Science, Technology and Innovation Policy

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

The United States, European and other countries are currently 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 fiscal 2011 to realize "evidence-based policy formulation" that will create effective policies for 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 data-infrastructure useful for research or analysis in the area of science, technology, and innovation policy formulation.



## Publishing information on research results

NISTEP also provides information to the public as follows.

### ◆NISTEP Newsletter

The NISTEP Newsletter (in Japanese) began in February of 2011 for the purpose of communicating our activities.

### ◆STI Horizon

“STI Horizon” is featuring valuable information on wider 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 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 the article.

## NISTEP Award (The Researchers with Nice Step)

Since 2005, NISTEP has been selecting people who have made significant contributions to S&T as “NISTEP Award (The Researchers with Nice Step)”. NISTEP holds symposia that are led by awarded persons. The symposia provide them with a venue for presenting cutting-edge research achievements and initiatives that promote science and technology.



NISTEP 2016 researchers visited the Ministry 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, send and accept researchers, and invite leading researchers for symposiums.

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

[List of collaborative institutes and universities]

- National Graduate Institute for Policy Studies (GRIPS)
- Japan Science and Technology Agency (JST)
- Overseas policy research institutions (USA, EU, Germany, UK, China, Korea, etc)



A workshop with researchers invited from overseas

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