

What is the Cross-ministerial Strategic Innovation Promotion Program (SIP)?

The Cross-ministerial Strategic Innovation Promotion Program (SIP) is a national project for science, technology and innovation, spearheaded by the Council for Science, Technology and Innovation as it exercises its headquarters function to accomplish its role in leading science, technology and innovation beyond the framework of government ministries and traditional disciplines. The SIP has been promoting 11 themes since 2016 (Cyber-security for Critical infrastructure since 2017) and newly 12 themes since 2018 that address the most important social problems facing Japan, as well as contribute to the resurgence of the Japanese economy. Each research program is led by one of experienced and talented program directors (PDs) who are responsible for end-to-end focused research and development, facilitating coordination among government, industry and academic entities. These directors have been charged with guiding their projects from basic research to practical application and commercialization, and ultimately to a clear exit strategy.

Background

Science, technology and innovation are core drivers of Japan's economic resurgence and sustainable growth. The Council for Science, Technology and Innovation has, under the leadership of the Prime Minister of Japan and the Minister of State for Science and Technology Policy, promoted planning and coordination for comprehensive basic science, technology and innovation policies, taking a bird's eye view of Japan's entire science and technology

landscape. With the goal of strengthening its own headquarters function, the Council for Science, Technology and Innovation proposed three new policies: (1) Strategic formulation of overall governmental science and technology budget; (2) The Cross-ministerial Strategic Innovation Promotion Program (SIP); and (3) Impulsing Paradigm Change through Disruptive Technologies (ImPACT).

The Three Arrows enhancing the headquarters function of the Council for Science, Technology and Innovation

1

Strategic Formulation of Overall Governmental Science and Technology Budget

The Council for Science, Technology and Innovation leads the formulation of the overall governmental science and technology budget, beginning with the study of budget requests at relevant ministries, utilizing policies such as the Comprehensive Strategy on Science, Technology and Innovation 2016. The government has also adopted a new mechanism whereby the Council takes the lead in directing the prioritized allocations of the budget. (The Science and Technology Budgeting Strategy Committee has convened ten times, chaired by the Minister of State for Science and Technology Policy and attended by directors-general and their equivalents from related ministries.)

2



The Council for Science, Technology and Innovation takes the lead in allocating budgets that cross the traditional framework of government ministries and disciplines. The Council promotes innovation along the entire path from basic research to effective exit strategies (practical application/commercialization), as well as taking on initiatives to reform regulations and systems.

3



Promotion of high-risk, high-impact research and development that could result in industry- and society-changing disruptive science, technology and innovation.

Features of the SIP Program

- ▶ The Council for Science, Technology and Innovation selects projects that **answer critical social needs and offer competitive advantage to Japanese industry and the economy.**
- ▶ **Cross-ministerial, multidisciplinary** initiatives.
- ▶ Promotes focused, end-to-end research and development, from **basic research to practical application and commercialization.** Utilizes regulations, systems, special wards, government procurement, etc. Significant for international standardization.
- ▶ **Intellectual property management system** facilitating strategic corporate use of research results.
- ▶ Built in **reforming regulations** as international standards, intellectual property strategy, supporting startup etc.

11 themes in the 1st period (2014-2018)

The Cross-ministerial Strategic Innovation Promotion Program SIP has identified 11 themes from the fields of energy, next-generation infrastructure and regional resources to address social issues, to revitalize the Japanese economy, and to bolster Japan's industrial posture in the world.

Programs

Program Name	Program Overview	Funding (Management) Agencies, Related Ministries
 Innovative Combustion Technology	Realize innovative combustion technologies for improving the maximum thermal efficiency of internal combustion engines in passenger cars to more than 50% (currently about 40%), by building sustainable industry-academia collaboration in the field of combustion technology. Strengthen Japan's industrial competitiveness, foster world-leading researchers, and contribute to energy savings and CO ₂ emission reduction.	Japan Science and Technology Agency (JST)
 Next-generation Power Electronics	Introduce major improvements (reduce loss by half, reduce volume to one-fourth of current levels) in the performance of current power electronics by using silicon carbide, gallium nitride, and other next-generation materials. Contribute to energy savings and the wider adoption of renewable energy, while creating large markets for and expanding the global market share of power electronics.	New Energy and Industrial Technology Development Organization (NEDO)
 Structural Materials for Innovation (SM⁴)	Aim to achieve gains in energy efficiency by adopting SM ⁴ for use in aircraft, which are strong, lightweight and heat-resistant. Develop a materials integration system capable of predicting processes and the performance of materials, to help shorten development time. Nurture and expand Japan's aircraft industry, while protecting and strengthening Japan's competitiveness in the component materials industry.	Japan Science and Technology Agency (JST)
 Energy Carriers	Create an economically secure, low-carbon society using hydrogen and other carriers from renewable energy sources. Spread and share these advancements around the world. Predict future innovations in technology as well as costs of energy, and develop scenarios utilizing hydrogen energy for a new energy society. Pursue establishment of technologies for the creation of a hydrogen value chain.	Japan Science and Technology Agency (JST)
 Next-generation Technology for Ocean Resources Exploration	Lead the world in developing efficient survey technologies to survey cobalt-rich manganese crusts, rare metals and other hydrothermal ores, pursuing creation of an ocean resource survey industry.	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
 Automated Driving System	Promote cooperative industry-academia-government research and development key issues leading to the creation of advanced automated driving systems. Work with relevant partners to establish public bus systems, etc. for the elderly and others with limited travel options. Drastically reduce accidents and traffic congestion for a major leap forward in travel convenience.	Cabinet Office, National Policy Agency, Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, New Energy and Industrial Technology Development Organization (NEDO)
 Infrastructure Maintenance, Renovation and Management	Realization of high quality infrastructure maintenance by cost-effective preventive measure, under the circumstances of serious accident risk increase and maintenance cost shortage because of aging. Creation of sustainable maintenance market, and promotion of expansion into overseas market.	Ministry of Land, Infrastructure, Transport and Tourism, Japan Science and Technology Agency (JST), New Energy and Industrial Technology Development Organization (NEDO)
 Enhancement of Societal Resiliency against Natural Disasters	To prepare for huge earthquakes, Tsunami, heavy rains, tornadoes, volcanic eruptions and other natural disasters, realize real-time prediction of disaster information by making maximum use of the latest science and technology, and build ICT-based real-time information sharing system through public-private cooperation. Aim to strengthen capability of each citizen to prevent, prepare and respond to disaster.	Japan Science and Technology Agency (JST)
 Cyber-security for Critical Infrastructure	Develop new security technologies for protecting critical infrastructure from the growing threat of cyber-attacks, such as measures for detecting malware in supply chains and for automatically detecting abnormal operation in systems. Help strengthen the international competitiveness of Japan's critical infrastructure industry through contributions to the 2020 Tokyo Olympic and Paralympic Games.	New Energy and Industrial Technology Development Organization (NEDO)
 Technologies for Creating Next-generation Agriculture, Forestry and Fisheries	Integrate agriculture policies and the creation of smart farms and innovative technologies that lead to value-added agriculture, forestry and fisheries products. Contribute to higher incomes for agricultural producers and development of rural areas. Improve quality of life, grow related industries through coordination with the private sector, and contribute to solving the world's food problems.	National Agriculture and Food Research Organization (NARO)
 Innovative Design/Manufacturing Technologies	Strengthen the competitiveness of Japan's manufacturing industry by leveraging the expertise of regional businesses and the creativity of individuals to establish a new style of manufacturing that breaks with time and location constraints. Through the innovative development of technology, facilitate high value-added product design and manufacturing to quickly respond to the needs of businesses and individual users.	New Energy and Industrial Technology Development Organization (NEDO)

12 themes in the 2nd period (2018-)

SIP has newly identified 12 themes from the fields necessary to drastically improve productivity (agriculture, logistics) to aim to contribute the revolution of productivity.

Programs

Program Name	Program Overview	Funding (Management) Agencies, Related Ministries
 Big-data and AI-enabled Cyberspace Technologies	Establish highly-sophisticated human interaction platform technology, a cross-domain data exchange platform, and AI based automatic negotiation platform technology which contribute to human-AI collaboration and conducts social implementation of a cyber-physical system utilizing big data and AI.	New Energy and Industrial Technology Development Organization (NEDO)
 Intelligent Knowledge Processing Infrastructure Integrating Physical and Virtual Domains	Develop the world's most advanced key technologies that enable high-functioning sensing, highly efficient data processing, and close cooperation with cyber domain, and apply and implement them in the real world.	New Energy and Industrial Technology Development Organization (NEDO)
 Cyber Physical Security for IoT Society	Develop and demonstrate 'Cyber-Physical Security Infrastructure' that can be used to protect IoT systems and services and the entire large-scale supply chain, including small and medium-sized businesses, in order to protect various IoT devices and to establish the safety and security of society as a whole, and also promote the social implementation of development results toward the realization of secure Society 5.0.	New Energy and Industrial Technology Development Organization (NEDO)
 SIP Automated Driving for Universal Services (SIP-adus)	Establish core technologies first in the world, such as gathering and distributing technologies of road traffic information(traffic signal, vehicle probe data, etc.) as the cooperative domain among automakers in order to compete with global companies in the fierce automated driving market, and also develop base platforms and promote their commercialization to achieve SAE Level 3 automated driving system on arterial roads.	New Energy and Industrial Technology Development Organization (NEDO)
 "Materials Integration" for revolutionary design system of structural materials	Aim to significantly reduce cost and dramatically shorten the development period and Materials Integration (MI) system for the inverse design, which can create suitable materials, processing and structures from the required performance, and be constructed and be socially implemented in order to maintain and develop strength in the field of Japanese materials developments. Super high performance structural materials will be developed by MI and the reliability evaluation techniques for the structural materials will be also established.	Japan Science and Technology Agency (JST)
 Photonics and Quantum Technology for Society 5.0	Photonics and quantum technologies is an extremely important foundation technology for realizing Society 5.0, and Japan has strengths. We will develop the world's most advanced laser material processing, photonic and electronic information processing and photonic quantum communication utilizing photonics and quantum technologies, and implement it in society in order to further improve the international competitiveness of photonics and quantum technologies.	National Institutes for Quantum and Radiological Science and Technology(QST)
 Technologies for smart bio-industry and agriculture	Aim at productivity revolution and enhancing competitiveness of agriculture, forestry and fisheries etc., realization of health-enhancing society by food, and realization of sustainable growing society by manufacturing using biological function by integration of biotechnology and digital and utilization of diverse and enormous data, in expectation of global expansion and intensifying competition of bioeconomy.	National Agriculture and Food Research Organization (NARO)
 Energy systems toward a decarbonized society	Explore overall optimization of major technologies by examining energy management systems and carry out research and development (R&D) as well as introduce the following three technologies into real society as innovative technologies in the future: Wireless Power Transmission /Transfer(WPT) System, Innovative Technologies for Low-Emission Carbon Use, and Universal Smart Power Module (USPM).	Japan Science and Technology Agency (JST)
 Enhancement of National Resilience against Natural Disasters	Develop an information system to support decision-making on a national and municipal level by making optimal use of satellites, IoT, big data, and other latest science and technology, and enhance national resilience for overcoming national crisis, thereby ensuring the safety and confidence of both today's and future generations.	National Research Institute for Earth Science and Disaster Resilience(NIED)
 Innovative AI Hospital System	Aim to offer sophisticated and advanced medical services through developing, establishing and socially implementing "AI hospital system" with the use of AI, IoT and big data technologies, and improve efficiency at medical institutions with drastically reduction of the burdens on medical personnel such as doctors and nurses.	National Institutes of Biomedical Innovation, Health and Nutrition(NIBIOHN)
 Smart Logistics Service	Build the world's first "logistics/products data platform" to be used to accumulate, analyze, and share data at the same time as we verify its effectiveness and introduce it to society. To achieve this goal improving the efficiency and productivity of overall supply chains including those inside and outside of Japan.	National Institute of Maritime, Port and Aviation Technology(MPAT)
 Innovative Technology for Exploration of Deep Sea Resources	Utilize abundant marine mineral resources in exclusive economic zones of our country and strengthen and develop our marine resource exploration technology. Drastically improve productivity in this field, establish and demonstrate marine resources survey technology deeper than 2000 meters deep first in the world and implement it in society.	Japan Agency for Marine-Earth Science and Technology(JAMSTEC)