



# **Mobilizing Science, Technology and Innovation for SDGs**

## **Japanese Actions in STI for SDGs**

April 2021

Japan Science and Technology Agency



## Preface

More than five years have passed since the 2030 Agenda was unanimously adopted at the United Nations General Assembly in the fall of 2015. Science, technology and innovation (STI) are expected to play important roles in the quest towards SDGs (STI for SDGs). During this period, how STI for SDGs can be implemented has been discussed at various levels, both domestically and internationally. Concrete measures have been put into practice. However, in 2020, the world was struck by the COVID-19 pandemic and is still struggling to find a way out. This has further delayed the progress toward the SDGs. The scientific and technological community needs to act quicker than ever both to recover from the pandemic and to achieve the SDGs.

The SDGs aim to realize a sustainable world where no one is left behind. They call for transformations of science and technology in every way, in terms of institutions, systems of practice, methods, and values that have been shaped over the past few centuries (this change prompting role of SDGs in STI is expressed as “SDGs for STI”). Science and technology can solve complex social problems only in combination with legal, regulatory, economic, and financial measures as well as transformations in individual and collective behavior. Integrating knowledge in the humanities and social sciences is vital. Various changes are required from the policy level to the individual research level, including more mission-oriented approaches, renewed public-private partnerships, digital transformation, and human capacity development.

The challenge is to create a knowledge centered civilization that realizes common human values: People, Planet, Prosperity, Peace, Partnership. To this end, it is important to work on transforming social systems, industrial structure, and STI in an integrated manner. The SDGs represent a movement in which regions, countries, local governments, corporations, individuals, and various groups are meant to work autonomously and coherently on their respective priorities, in cooperation with the United Nations. On top of such global challenges as climate change and widening inequality, Japan is uniquely struggling with an aging population and declining rural communities. These are the problems Japan is facing ahead of the rest of the world. Given our unique circumstances, the contributions of STI are all the more important in achieving sustainability.

This report summarizes the situation of STI for SDGs in Japan, as seen by the members of the Japan Science and Technology Agency (JST) who have been involved in international discussions and activities at the United Nations, OECD, and other organizations, and in domestic activities by JST and others. In what follows, we will report the ongoing practices and remaining challenges of STI for SDGs in Japan. Chapter 1 provides an overview of Society 5.0, Japan's national vision that driving STI for SDGs. Chapter 2 lays out various activities by diverse stakeholders. Chapter 3 reviews international collaboration with developing countries.

We hope that these Japanese experiences and struggles will be of value to people in other countries in policy making, academic research, the private sector, NPOs, and more, and will contribute to the flourishing of an international ecosystem of STI for SDGs.

**April 2021**

**Japan Science and Technology Agency (JST)**

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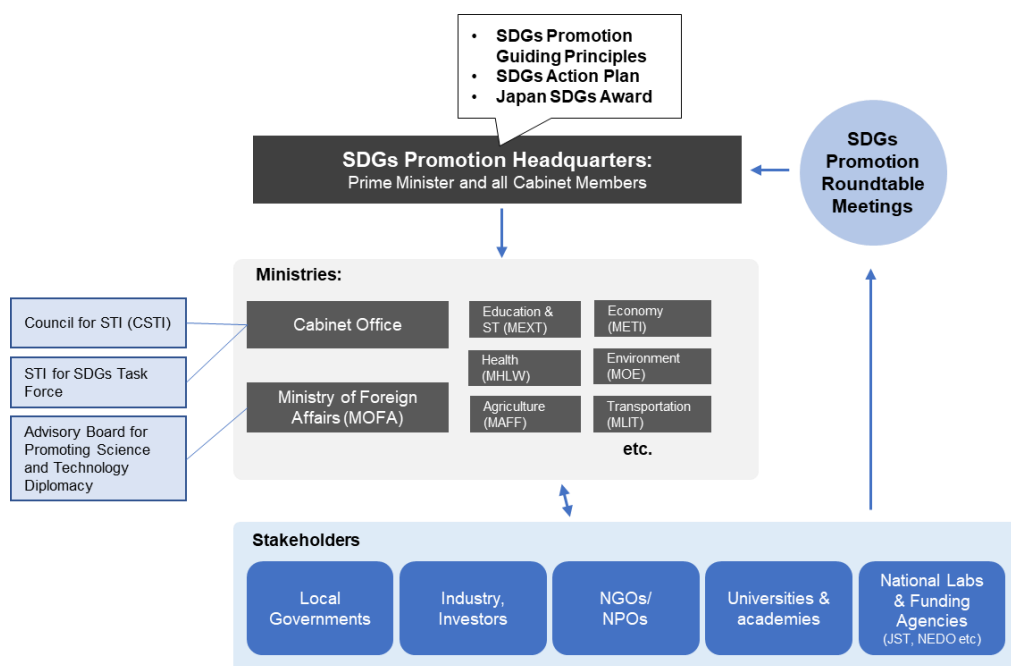
# Chapter 1

## Overview of Japanese Efforts in STI for SDGs

Since 2015, Japan has acted on many levels. Particularly in terms of science, technology, and innovation (STI), efforts have been promoted by linking SDGs with Society 5.0, the central concept in Japan's STI policies. Societal challenges exemplified by SDGs call for a systematic change in how STI activities are planned, funded and conducted. In this chapter, we present an overview of the efforts in STI for SDGs in Japan.

### 1.1 Promoting SDGs in Japan

Since the adoption of the SDGs by the UN General Assembly in the autumn of 2015, the Japanese government has built up a structure to promote SDGs as shown in **Figure 1**.



**Figure 1.** Japan's SDGs Promotion Structure. Source: Author.

In May 2016, the Sustainable Development Goals (SDGs) Promotion Headquarters ("Promotion Headquarters") was established with all the cabinet ministers as its members. In December 2016, SDGs Implementation Guiding Principles ("Guiding Principles") were stipulated after discussions in SDGs Promotion Roundtable Meetings attended by a wide range of stakeholders (government, NGO/NPOs, experts, private sectors, international organizations, etc.).

In the revised "Guiding Principles" of 2019<sup>1</sup>, the following eight topics were identified as priorities and clustered under the "Five Ps" upheld in the 2030 Agenda.

<sup>1</sup> SDGs Promotion Headquarters, "SDGs Implementation Guiding Principles Revised Edition (temporary translation)", December 20, 2019. [https://www.kantei.go.jp/jp/singi/sdgs/pdf/jisshi\\_shishin\\_r011220e.pdf](https://www.kantei.go.jp/jp/singi/sdgs/pdf/jisshi_shishin_r011220e.pdf) (accessed: 22.3.2021)

**People**

1. Realization of gender equality and a society where every person can play an active role
2. Achievement of good health and longevity

**Prosperity**

3. Creating growth markets, revitalization of rural areas, and promoting science technology and innovation
4. Sustainable and resilient land use and promoting quality infrastructure

**Planet**

5. Energy conservation and renewable energy, disaster risk reduction and climate change countermeasures, and sound material-cycle society
6. Conservation of biodiversity, forests, oceans, and other environments

**Peace**

7. Achieving peaceful, safe, and secure societies

**Partnership**

8. Strengthening the means and frameworks for the implementation of the SDGs

The Promotion Headquarters has announced an SDGs Action Plan every year since 2018 that complies with the Japanese government's key initiatives. In the latest SDGs Action Plan 2021, the following four pillars are listed (**Figure 2**).

1. Countering infectious disease and preparing for the next crisis
2. Business for building back better and growth strategies through innovation
3. SDGs-driven regional revitalization, creating a virtuous cycle of economy and environment
4. Accelerating actions through empowerment and strengthening bonds among people

The second pillar emphasizes recovery ("building back better") from the COVID-19 pandemic through innovation. It aims to accelerate the efforts to materialize the Society 5.0 (described in the next section), and to promote digital transformation for a "new normal" where everyone can benefit from digitization. It also stresses the need to promote STI to solve societal problems and achieve a sustainable, circular society as required by the SDGs.

<p><b>1. Countering infectious disease and preparing for the next crisis</b></p> <ul style="list-style-type: none"> <li>• Strengthen the capacity to respond to infectious diseases</li> <li>• Promote efforts to achieve universal health coverage (UHC)</li> <li>• Improve nutrition, water, and sanitation to develop environment resistant to infectious diseases</li> </ul>	<p><b>3. SDGs-driven regional revitalization, Creating a virtuous cycle of economy and environment</b></p> <ul style="list-style-type: none"> <li>• Aim for carbon neutrality by 2050</li> <li>• Promote disaster prevention and mitigation, national resilience, and high-quality infrastructure</li> <li>• Realize "Osaka Blue Ocean Vision" that aims to reduce additional pollution by marine plastic litter to zero by 2050</li> <li>• Promote regional development driven by the SDGs</li> </ul>
<p><b>2. Business for building back better and growth strategies through innovation</b></p> <ul style="list-style-type: none"> <li>• Continue the efforts toward Society 5.0, promote DX</li> <li>• Incorporate SDGs into corporate management through the promotion of ESG investment</li> <li>• Bio-strategies and smart agriculture, forestry, and fisheries</li> </ul>	<p><b>4. Accelerating actions through empowerment and strengthening bonds among people</b></p> <ul style="list-style-type: none"> <li>• Promote gender equality, diversity, and accessibility</li> <li>• Promote education for sustainable development (ESD)</li> <li>• Utilize various opportunities to promote the rule of law and the SDGs in sports.</li> </ul>

**Figure 2.** Four pillars of the SDGs Action Plan 2021.

Source: "SDGs Action Plan 2021." Bulleted items are excerpted and tentatively translated by the author.

The Promotion Headquarters has also taken measures to visualize efforts for SDGs by various national stakeholders. In 2017, the Japan SDGs Award was founded to highlight companies, organizations, etc. for their outstanding efforts, either domestically or internationally, to achieve SDGs<sup>2</sup>. The SDGs Promotion Headquarters determines award winners based on the opinions of a wide range of stakeholders who have expertise in the SDGs. In 2018, the Japan SDGs Action Platform<sup>3</sup> was launched on the Ministry of Foreign Affairs website, to collect and share information related to SDGs from relevant ministries, local governments, and businesses.

Regarding STI for SDGs, the Council for Science, Technology and Innovation (CSTI) in the Cabinet Office took the initiative in 2018 to form an STI for SDG Task Force consisting of members from across ministries as well as experts in STI policy. This Task Force aims to discuss roadmaps in STI for SDGs and to build up models and platforms for Society 5.0.

STI for SDGs is of importance to science diplomacy. In Japan, Science and Technology Advisor to the Minister for Foreign Affairs was appointed for the first time in 2015 and the Advisory Board for Promoting Science and Technology Diplomacy (“Advisory Board”) was established by the Minister for Foreign Affairs in 2015. The current Advisor is Dr. MATSUMOTO Yoichiro, the former President of the Tokyo University of Science, who was appointed in April 2020. International cooperation in STI for SDGs is one of the main issues discussed in the Advisory Board. In 2017, the Board published a report “Recommendation for the Future”<sup>4</sup>, which gives recommendations on how Japan should contribute to the achievement of the SDGs through STI in cooperation with other nations.

Japan has worked closely with the United Nations. In 2017, Japan submitted the Voluntary National Review (VNR) to the High-Level Political Forum (HLPF).<sup>5</sup> Japan will submit its 2nd Voluntary National Review in the upcoming HLPF, which will be held in July 2021. Japan has cooperated with the UN’s STI Forum (the Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals), including attendance at the 10-Member Group of high-level representatives appointed by the Secretary General.<sup>6</sup>

UNDP (SDG Action Campaign team and Representation Office in Tokyo) and the Japan SDGs Action Promotion Council co-organized the SDGs Global Festival of Action from Japan in March 2021, as the first regional spin-off edition of the SDG Global Festival of Action.<sup>7</sup>

<sup>2</sup> Japan SDGs Award. <https://www.mofa.go.jp/policy/oda/sdgs/award/index.html> (accessed: 22.3.2021)

<sup>3</sup> Japan SDGs Action Platform. <https://www.mofa.go.jp/policy/oda/sdgs/index.html> (accessed: 22.3.2021)

<sup>4</sup> Advisory Board for Promotion of Science and Technology Diplomacy, chaired by the Science and Technology Advisor to the Minister for Foreign Affairs of Japan, Recommendation for the Future: STI as a Bridging Force to Provide Solutions for Global Issues,” 2017. <https://www.mofa.go.jp/files/000255801.pdf> (accessed: 22.3.2021)

<sup>5</sup> SDGs Promotion Headquarters, “Japan’s Voluntary National Review Report on the implementation of the Sustainable Development Goals,” 2017. <https://www.mofa.go.jp/files/000287390.pdf> (accessed: 22.3.2021)

<sup>6</sup> NAKAMURA Michiharu, an Counselor to the President of the Japan Science and Technology Agency (JST) was appointed to the 10-Member Group during 2018-2020.

<sup>7</sup> SDGs Global Festival of Action from Japan. <https://globalfestivalofaction.org/japan-en/> (accessed: 26.3.2021)

### Box: Progress towards SDGs in Japan

In the Sustainable Development Report (SDR) 2020, published by the Sustainable Development Solutions Network (SDSN) and Bertelsmann Stiftung, Japan was ranked 17th among all countries in the overall achievement of SDGs<sup>8</sup>. Japan has received high ratings in SDG4 (education), SDG9 (industry, innovation and infrastructure) and SDG16 (peace and justice), but is struggling with SDG5 (gender equality), SDG13 (climate action), and SDG14 (life below water), SDG15 (life on land), SDG17 (partnership).

**Table 1.** Current Assessment and trends for each SDGs in Japan.

Source: Adapted from SDR2020 <https://dashboards.sdqindex.org/profiles/jpn> (accessed: 5.4.2021).  
Rearranged into a table by the author.

Assessment	SDGs and trends (in arrows)				
SDG Achieved	<div> <div>4 QUALITY EDUCATION ↑</div> <div>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE ↑</div> <div>16 PEACE, JUSTICE AND STRONG INSTITUTIONS ↑</div> </div>				
Challenges Remain	<div> <div>1 NO POVERTY ↗</div> <div>3 GOOD HEALTH AND WELL-BEING ↑</div> <div>6 CLEAN WATER AND SANITATION ↑</div> <div>8 DECENT WORK AND ECONOMIC GROWTH ↑</div> <div>11 SUSTAINABLE CITIES AND COMMUNITIES ↑</div> </div>				
Significant Challenges	<div> <div>2 ZERO HUNGER ↗</div> <div>7 AFFORDABLE AND CLEAN ENERGY ↗</div> <div>10 REDUCED INEQUALITIES ↓</div> <div>12 RESPONSIBLE CONSUMPTION AND PRODUCTION ● ●</div> </div>				
Major Challenges	<div> <div>5 GENDER EQUALITY →</div> <div>13 CLIMATE ACTION →</div> <div>14 LIFE BELOW WATER →</div> <div>15 LIFE ON LAND ↗</div> <div>17 PARTNERSHIPS FOR THE GOALS ↗</div> </div>				

<sup>8</sup> Sustainable Development Report (SDR) 2020, Japan's country profiles. <https://dashboards.sdqindex.org/profiles/jpn> (accessed: 22.3.2021)

### Box: SDGs and Japan's actions in the chronological big picture

The UN's resolution on the SDGs in 2015 did not just come out of the blue; it came into existence in a continuation of efforts to respond to the ongoing global trends in such areas as the economy and industry, global development, climate change, evolving science and technologies, and transforming societies. The quest for a sustainable world where no one is left behind does not end in 2030 but will continue thereafter.

Japan's actions towards a sustainable world is in this bigger picture as well (Figure 3). Japan has been struggling to overcome unique challenges such as an aging population and declining rural communities, and is trying to tackle these problems along with the global issues listed in the SDGs.

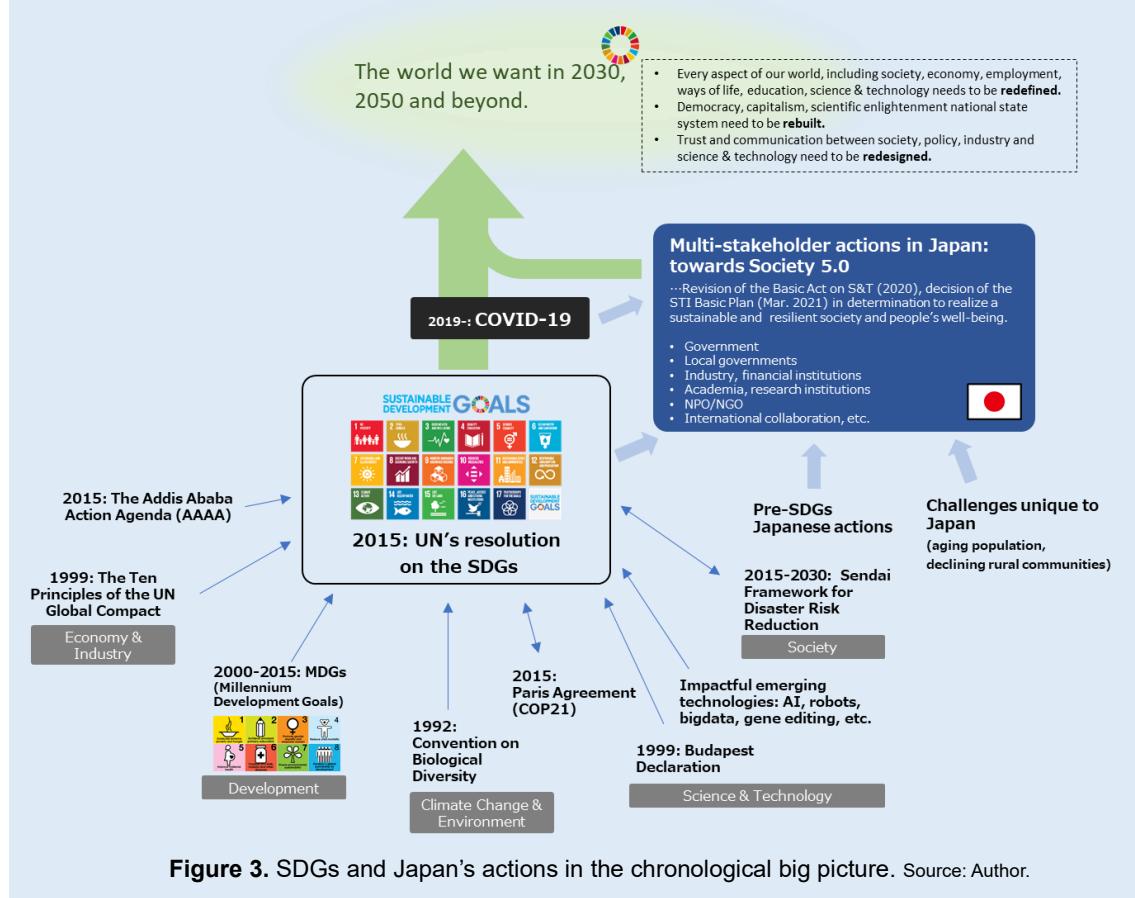


Figure 3. SDGs and Japan's actions in the chronological big picture. Source: Author.

## 1.2 Japan's national STI system and "Society 5.0"

In 2020, Japan revised its Basic Act on Science and Technology, renaming it the Basic Act on Science, Technology and Innovation, so as to emphasize the need for STI policies to transform society through "comprehensive knowledge" including the humanities and social sciences.

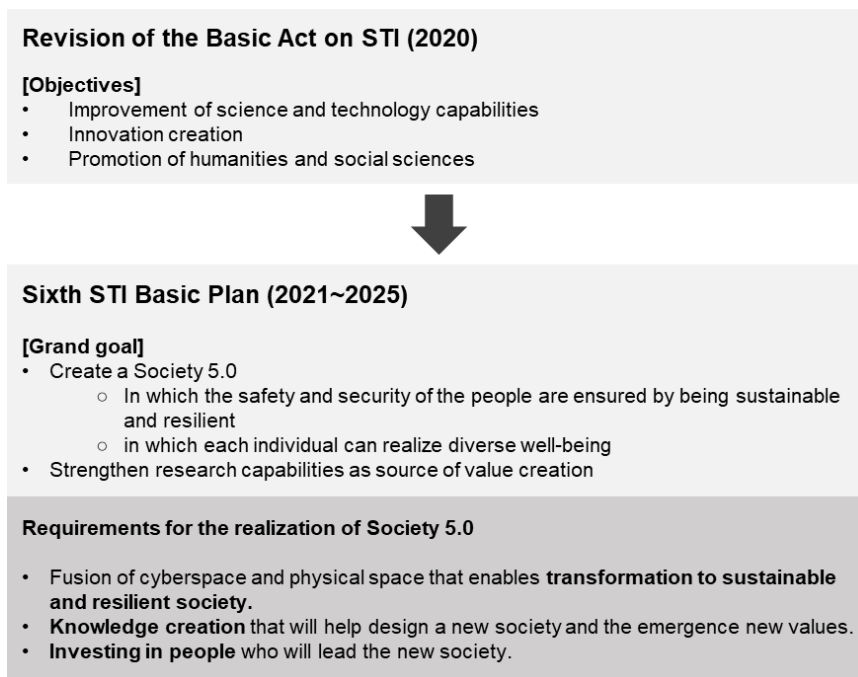
The Council for Science, Technology and Innovation (CSTI), under the leadership of the Prime Minister and the Minister of State for Science and Technology Policy, serves as the headquarters for the promotion of STI policy in Japan.<sup>9</sup> Every five years, based on the

<sup>9</sup> Cabinet Office, Council for Science, Technology and Innovation. <https://www8.cao.go.jp/cstp/english/index.html> (accessed: 22.3.2021)



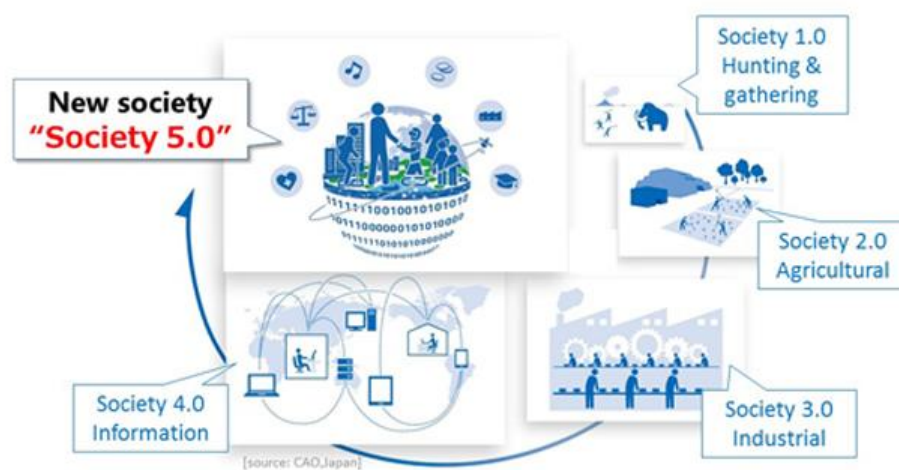
discussions in CSTI and other inputs, the Cabinet decides on a Science and Technology Basic Plan, that states the direction and goals of R&D across all government agencies. In 2021, the Sixth Basic Plan (renamed “Science, Technology and Innovation Basic Plan”) was started.

In the Sixth STI Basic Plan, emphasis is put on tackling global issues such as climate change as well as achieving the domestic transformations needed to recover from the COVID-19 pandemic. Central to the plan is the concept of “Society 5.0” (**Figure 4**).



**Figure 4.** Basic Act and Basic Plan. Source: Created by the author based on Cabinet Office documents.

The vision of Society 5.0 was proposed in the Fifth S&T Basic Plan in 2015. Society 5.0 is regarded as “a human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space.” Society 5.0 is envisioned as a successor to the sequence of transformations of human societies, from hunter-gatherer society (Society 1.0) to agricultural society (Society 2.0) to industrial society (Society 3.0) and finally to the information society (Society 4.0). The Sixth STI Basic Plan positions the next five years as the period for realizing Society 5.0.



**Figure 5.** Transition to Society 5.0.

Source: Cabinet Office. [https://www8.cao.go.jp/cstp/english/society5\\_0/index.html](https://www8.cao.go.jp/cstp/english/society5_0/index.html) (accessed: 25.3.2021)

Society 5.0 aims to be sustainable and resilient and provide security for all people. It also aspires to realize diverse forms of well-being in accordance with traditional Japanese values such as “symbiosis with nature,” “spirit of sharing,” and “three-way satisfaction.”<sup>10</sup>

#### ■ Enabling technologies of Society 5.0

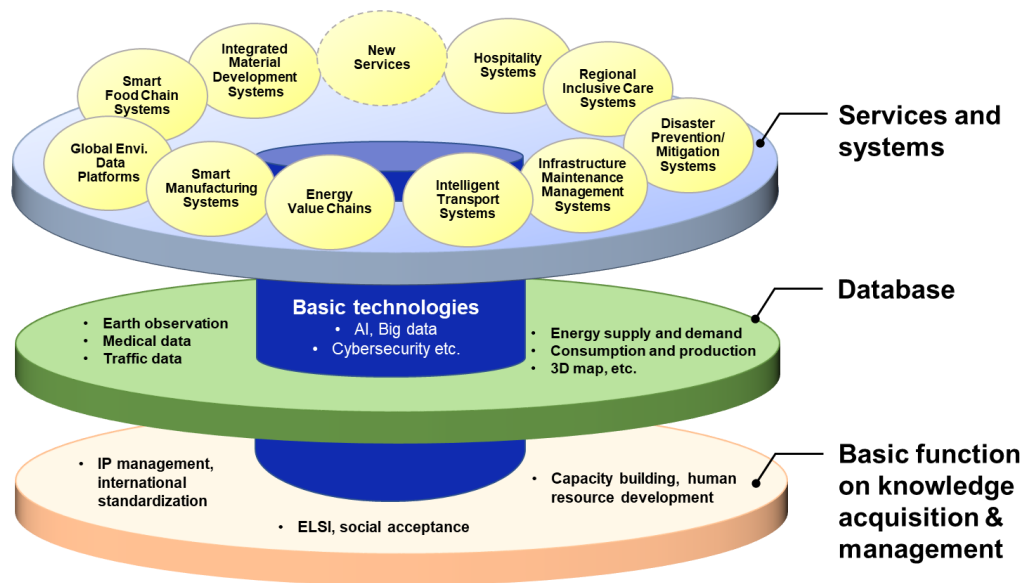
A key enabler for such a society will be information and communication technology (ICT). ICT is to be utilized not only for high-tech industry but also for realizing an affluent and high-quality life for the people by combining cyber and physical spaces. This vision is well in line with the SDGs, which aim to achieve both economic growth and sustainability. As has been already mentioned, realization of Society 5.0 is a part of the SDGs Action Plan 2021.

The tight connection between Society 5.0 and SDGs is recognized and emphasized by industry as well. In November 2017, the Japan Business Federation (Keidanren) revised its Charter of Corporate Behavior to advocate “delivering on the SDGs through the realization of Society 5.0 (‘Society 5.0 for SDGs’).”<sup>11</sup> The Charter further declares, “Corporations should also encourage behavioral transformation not only within themselves, but also in their group companies and supply chains, and, by fostering partnership and collaboration with a diverse range of organizations, take action toward the realization of Society 5.0 and, through that, deliver on the SDGs.”

Society 5.0 calls for the construction of a platform consisting of a wide range of technologies (such as AI, big data analysis and cybersecurity), large and diverse databases, as well as various enabling conditions such as human resources and knowledge management (**Figure 6**). This systemic approach to Society 5.0 is consistent with the STI for SDGs roadmap (which will be discussed in the next section).

<sup>10</sup> The idea that business should benefit local communities as well as sellers and clients is said to have been an ethos shared among some merchants in Japan’s early modern period.

<sup>11</sup> Japan Business Federation, “Revision of the Charter of Corporate Behavior.” <https://www.keidanren.or.jp/en/policy/csr/charter.html> (accessed 25.3.2021)



**Figure 6.** The Platform for Society 5.0.

Source: Modified and translated from a slide by Dr. Kazuo Kyuma, former CSTI member, Cabinet Office.  
[https://www8.cao.go.jp/cstp/tyousakai/juyoukadai/infra\\_fukkou/12kai/sanko2.pdf](https://www8.cao.go.jp/cstp/tyousakai/juyoukadai/infra_fukkou/12kai/sanko2.pdf) (accessed: 19.4.2021)

Among the pressing issues for realizing Society 5.0 are carbon neutrality and digital transformation (DX). Both are also focused in the Sixth STI Basic Plan. Based on these concepts, a variety of resilient, sustainable, and smart cities focused on human wellbeing are being designed and constructed in Japan to meet local needs and contexts. These activities will form an important element of the next TICAD (Tokyo International Conference on African Development) and the Osaka-Kansai Expo in 2025.

### Box: Expo 2025 Osaka, Kansai

The Japan International Exposition (abbreviated as “Expo 2025 Osaka, Kansai”) is scheduled to be held in 2025. The “Japan Association for the 2025 World Exposition” was established in 2019, and the Expo’s “Master Plan” was announced in December 2020.<sup>12</sup>

- Theme: “Designing future society for our lives”
- Concept: “People’s Living Lab –A laboratory for a future society”
- Venue: Yumeshima (waterfront of Osaka City)
- Period: April 13 (Sun.) to October 13 (Mon.), 2025
- Projected number of visitors: approximately 28.2 million

The Expo is intended to provide “an opportunity to achieve the SDGs and advance beyond the SDGs and to demonstrate various concepts for the realization of Society 5.0, with the aim of building a sparkling future society.” Official participants from all over the world (participating countries and international organizations) will be required to select one or more of the three sub-themes (saving lives, empowering lives, and connecting lives) and “work on one or more of the 17 SDGs.” The Expo venue is expected to be a showcase for the implementation of Society 5.0.

<sup>12</sup> Japan Association for the 2025 World Exposition, “Master Plan for Expo 2025 Osaka, Kansai, Japan.”  
<https://www.expo2025.or.jp/en/news/news-20201225/> (accessed: 25.3.2021)

## ■ Carbon neutrality and the Green Growth strategy

In October 2020, under the newly established Suga administration, Japan set a goal of achieving carbon neutrality by 2050, and in December 2020, the Ministry of Economy, Trade and Industry (METI) formulated a “Green Growth Strategy Through Achieving Carbon Neutrality.”<sup>13</sup>

This strategy aims to reduce greenhouse gas emissions to net zero by 2050. It proposes to do so by reducing emissions through electrification, adoption of carbon free electricity, and removal of carbon dioxide by absorption technology. The government will first establish a fund of 2 trillion yen to be used over the next 10 years to stimulate 15 trillion yen worth of private R&D and investment. Additional key policy tools will include the utilization of taxation systems, finance, regulations, reforms and standardization (e.g., carbon pricing), and international cooperation.

The strategy also lists 14 priority areas for achieving its targets and presents a progress schedule up to 2050. This progress schedule shows specific measures to enhance Japan's international competitiveness and also to promote self-sustaining market expansion according to the four phases of “R&D,” “demonstration,” “scaling-up,” and “independent commercialization.” In 2021, the Sixth Basic Energy Plan is expected to draw path toward carbon neutrality by 2050 based on more specific scenario analysis.

## ■ Digital transformation (DX) and artificial intelligence (AI)

Digital transformation (DX) is another priority of Japan's STI policies. DX is a transformation of business models, organizations, corporate culture, and more through the diffusion of ICT. DX is expected to be a main driving force towards achieving Society 5.0.

In order to promote DX, data and data processing through AI (artificial intelligence) should be conducted in a manner that does not conflict with human values. With the aim of developing new international rules for data utilization, the “Osaka Track” was launched in preparation for the G20 Osaka Summit at which the concept of “Data Free Flow with Trust (DFFT)” for data distribution<sup>14</sup> was proposed. Various measures for data utilization have been taken, including the formulation of “Social Principles of Human-Centric AI” (March 2019).<sup>15</sup> The establishment of a Japan Digital Agency to promote overarching governmental DX is planned in 2021.

There is a deep relationship between DX/AI and SDGs. Sustainability is one of the three basic principles of the “Social Principles of Human-Centric AI,” and the “AI Strategy 2019”<sup>16</sup> published in June 2019 lists the following five fields as priorities in the social implementation of AI: 1) health care, medical care, and long-term care, 2) agriculture, 3) national resilience, 4)

<sup>13</sup> Ministry of Economy, Trade and Industry. “‘Green Growth Strategy Through Achieving Carbon Neutrality in 2025’.” [https://www.meti.go.jp/english/press/2020/1225\\_001.html](https://www.meti.go.jp/english/press/2020/1225_001.html) (accessed: 25.3.2021)

<sup>14</sup> World Economic Forum, “Data Free Flow with Trust (DFFT): Paths towards Free and Trusted Data Flows,” 2020. <https://www.weforum.org/whitepapers/data-free-flow-with-trust-dfft-paths-towards-free-and-trusted-data-flows> (accessed: 25.3.2021)

<sup>15</sup> Cabinet Office, “Social Principles of Human-Centric AI,” 2019. <https://www.cas.go.jp/jp/seisaku/jinkouchinou/pdf/humancentricai.pdf> (accessed: 25.3.2021)

<sup>16</sup> Integrated Innovation Strategy Promotion Council, “AI Strategy 2019 (tentative translation),” 2019. [https://www.kantei.go.jp/jp/singi/ai\\_senryaku/pdf/aistrategy2019en.pdf](https://www.kantei.go.jp/jp/singi/ai_senryaku/pdf/aistrategy2019en.pdf) (accessed: 25.3.2021)

transportation infrastructure and logistics, and 5) regional revitalization (smart city). For example, ARIKAWA Taro and others are proposing a vision of a smart city in the post-COVID era in which AI handles personal data (people's positions, physical and mental conditions) and other data (of infrastructure, traffic, energy supply, etc.) to give feedback that allows for a flexible response to the spread of infection.<sup>17</sup>

### 1.3 STI for SDGs roadmaps

#### ■ Guidebook for the Preparation of STI for SDGs Roadmaps

One important tool for promoting STI for SDGs is the “STI for SDGs Roadmaps.”<sup>18</sup> A roadmap is a blueprint to develop, implement, monitor, and evaluate a consistent plan among diverse stakeholders. The UN has established a working group within the IATT (UN Interagency Task Team on STI for the SDGs) to discuss and share methodologies for developing STI for SDGs roadmaps, with four meetings of experts held since 2018. The second meeting was held in Tokyo, Japan, where more than 70 experts from 12 countries gathered. As part of this process, the working group decided to publish a guidebook for the preparation of the roadmaps. A draft version of the guidebook was presented at the STI Forum in May 2019, and the final version was released in September 2020 with the title “Guidebook for the Preparation of Science, Technology and Innovation for SDGs Roadmaps.”<sup>19</sup>

At the G20 Summit in Osaka in 2019, the “Guiding Principles for the Development of Science, Technology, and Innovation for SDGs Roadmaps” were adopted as an annex to the Joint Declaration.<sup>20</sup> Japan has actively participated in the expert meetings and contributed to the G20 by compiling annexes and providing financial support for the preparation of the guidebook through the World Bank. International pilot programs to address STI for SDGs using the roadmaps were launched in July 2019, and Ghana, Kenya, Ethiopia, India, and Serbia have been selected as pilot countries for the first phase. Japan is working with the EU as a partner country.

#### ■ Roadmaps in Japan

In Japan, the need for roadmaps have been increasingly emphasized. Such momentum led to the creation of various strategies and roadmaps, such as AI Strategy 2019 (June 2019) and the Environment Innovation Strategy (January 2020).

In a preliminary review, the Cabinet Office lists three approaches to the creation of an STI for

<sup>17</sup> Arikawa et al., “The Future of Urban Design.” Forthcoming, 2021.

<sup>18</sup> Cabinet Office, Government of Japan, “Guiding Principles for the Development of STI for SDGs Roadmaps [Draft] - From Japan's perspective -,” November 27, 2018. [https://www8.cao.go.jp/cstp/english/doc/roadmaps\\_draft.pdf](https://www8.cao.go.jp/cstp/english/doc/roadmaps_draft.pdf) (accessed: 22.3.2021)

<sup>19</sup> United Nations Inter-Agency Task Team on Science, Technology and Innovation for the SDGs (IATT) Sub-Working Group on STI Roadmaps co-led by World Bank, DESA, UNCTAD and UNESCO, “Guidebook for the Preparation of Science, Technology and Innovation for SDGs Roadmaps,” 2020. [https://sustainabledevelopment.un.org/content/documents/26937Guidebook\\_STI\\_for\\_SDG\\_Roadmaps\\_final\\_Edition.pdf](https://sustainabledevelopment.un.org/content/documents/26937Guidebook_STI_for_SDG_Roadmaps_final_Edition.pdf) (accessed: 25.3.2021)

<sup>20</sup> G20 Osaka Leaders' Declaration. [https://www.mofa.go.jp/policy/economy/g20\\_summit/osaka19/en/documents/final\\_g20\\_osaka\\_leaders\\_declaration.html](https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/en/documents/final_g20_osaka_leaders_declaration.html) (accessed: 25.3.2021)

SDGs roadmap,<sup>21</sup> “(1) address challenges in various service areas with specific technologies,” “(2) address specific challenges by utilizing various technologies,” and “(3) address challenges by back casting from the desired future outcomes.”

Though there is momentum for building roadmaps in many R&D domains as shown in the two Boxes below, more comprehensive STI for SDGs roadmaps are still needed for major SDGs-related challenges in Japan. The Basic Act on Science and Technology was amended in 2020 to strengthen the driving force towards innovation. The Sixth STI Basic Plan emphasizes mission-oriented policies (see section 1.4). These reforms are expected to help formulate and implement STI for SDGs roadmaps in a more integrated form at the national, sub-national and sectorial levels over the coming years.

### Box: Public-Private ITS Roadmaps

In 2017, “Public-Private ITS (Intelligent Transport Systems) Initiative/Roadmaps” were decided by the Cabinet<sup>22</sup>. These roadmaps aim to “build and maintain the world’s best ITS and thereby contribute to its people and the world” and seek to promote industry-academic-government collaboration in the implementation of automated driving at a national level. The “Strategic Conference for the Advancement of Utilizing Public and Private Sector Data” of the “Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society” established within the Cabinet annually updates the scenarios for the realization of highly automated driving up to 2025 and publishes them as “Public-Private ITS Initiatives and Roadmaps.”

Utilizing these roadmaps as a part of Japan’s Cross-ministerial Strategic Innovation Promotion Program (SIP), an “Automated Driving for Universal Services Project”<sup>23</sup> (SIP-adus) has been carried out. The project aims to “promote research and development in a seamless manner from the basic research stage to the final outcome by endeavoring to strengthen cooperation among industry, academia and government.”

Also using these roadmaps, the Ministry of Land, Infrastructure, Transport and Tourism, the Ministry of Internal Affairs and Communications, the National Police Agency, the Ministry of Education, Culture, Sports, Science and Technology, and other relevant parties engage in cross-ministerial efforts for social implementation, such as the revision of laws and regulations and international standardization (**Figure 7**).

This is a good example of how science and technology is beginning to achieve transformation in concert with governance, economy and finance, and individual and collective action, which are the “four levers” for transformation proposed in the UN’s Global Sustainable Development Report (GSDR 2019).<sup>24</sup>

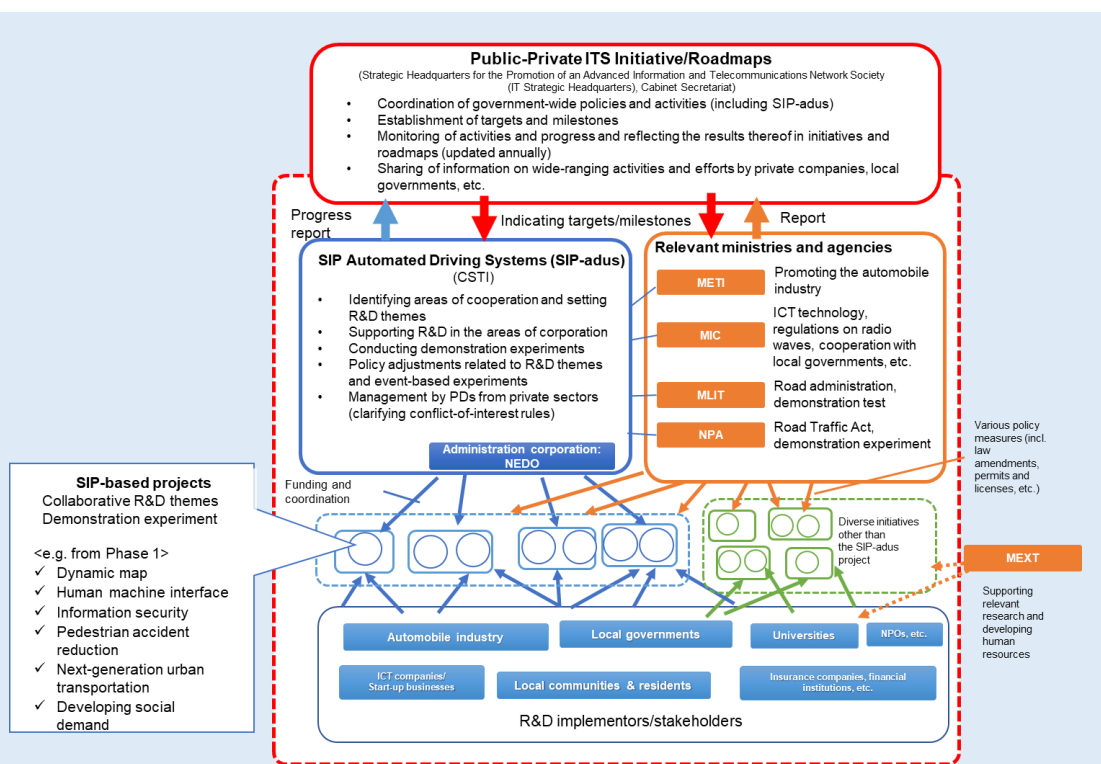
<sup>21</sup> Cabinet Office, “STI for SDGs Roadmap (Tentative),” 2020. [https://www8.cao.go.jp/cstp/english/roadmap\\_e.pdf](https://www8.cao.go.jp/cstp/english/roadmap_e.pdf) (accessed: 25.3.2021)

<sup>22</sup> Strategic Conference for the Advancement of Utilizing Public and Private Sector Data, Strategic Headquarters for the Advanced Information and Telecommunications Network Society, “Public-Private ITS Initiative/Roadmaps 2017.” [https://japan.kantei.go.jp/policy/it/itsinitiative\\_roadmap2017.pdf](https://japan.kantei.go.jp/policy/it/itsinitiative_roadmap2017.pdf) (accessed: 25.3.2021)

<sup>23</sup> Cross-ministerial Strategic Innovation Promotion Program (SIP), Automated Driving for Universal Services. <https://en.sip-adus.go.jp/> (accessed: 25.3.2021)

<sup>24</sup> United Nations, Independent Group of Scientists appointed by the Secretary-General, “Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development,” 2019. [https://sustainabledevelopment.un.org/content/documents/24797GSDR\\_report\\_2019.pdf](https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf) (accessed: 25.3.2021)





**Figure 7.** Public-Private ITS Initiative/Roadmaps and SIP-adus. Source: Prepared by the Center for Research and Development Strategy, Japan Science and Technology Agency based on relevant documents.

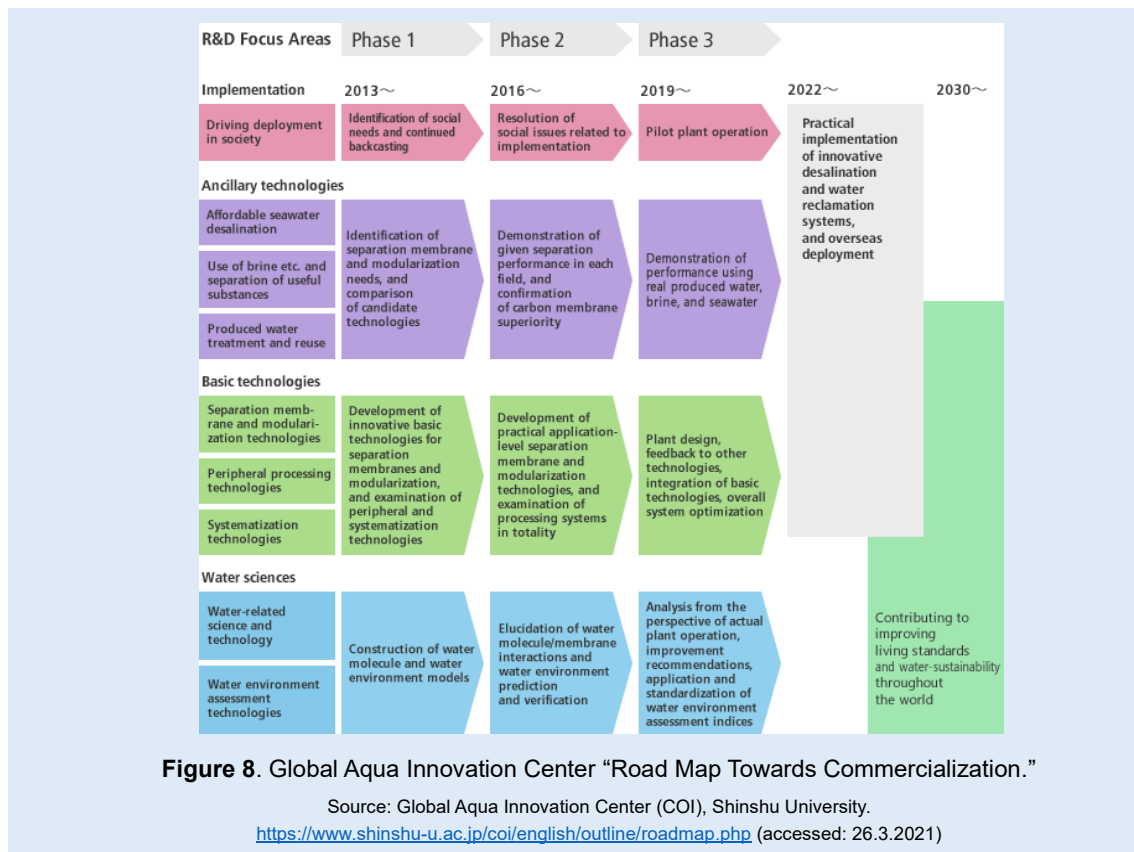
### Box: Project-Level Roadmap in Shinshu University's Global Aqua Innovation Center

Roadmaps created at multiple levels (international, national, and local) will ideally work in a coherent manner. Roadmaps on a project level are also effective.

A Center of Innovation (COI) Program in Shinshu University's Global Aqua Innovation Center tackles global water issues to ensure universal access to clean and safe water. The Program consists of researchers and engineers from multiple universities and the private sector who are working on the "development of durable water separation membranes and other applications that leverage revolutionary materials such as nanocarbons, and on modularization, systematization, production plant design, commercialization and other activities aimed at bringing innovative water desalination and reclamation systems to fruition."

The Program has set objectives for the resolution of water-related issues and has formulated a comprehensive roadmap that covers not only R&D but also perspectives on implementation such as commercialization and social acceptance (Figure 8). For example, from 2018, members in this program have been developing a device in Tanzania to measure fluoride concentration in drinking water, a significant problem affecting the health of many people.<sup>25</sup> The device is designed so it can be built, managed and utilized in a local setting.

<sup>25</sup> Ota, E. H., Kim, M. L., Dietrich, S., Takada, R., Nakaya, S., & Kimura, M. (2021). Open-Source Portable Device for the Determination of Fluoride in Drinking Water. *ACS sensors*, 6(1), 259-266.



## 1.4 Systemic transformation of STI

While STI provides indispensable means to achieve SDGs, SDGs in turn are calling for a transformation of STI. In the age of SDGs, STI activities should be planned, funded and conducted differently.

The requirement for such a transformation precedes SDGs. In 1999, the World Conference on Science held in Budapest adopted the “Declaration on Science and the Use of Scientific Knowledge,” commonly referred to as the “Budapest Declaration,” proposing the concept of “Science in Society and Science for Society.” Science and technology in the 21st century are, and should be, strongly coupled to society. They should not only lead to knowledge creation, but to solving social challenges as well.

In order to utilize R&D for social issues, it is important to include diverse stakeholders from the start. Solutions cannot be reached only by technology; efforts should be combined with non-R&D such as legal, economic and ethical aspects. Contributions from multiple disciplines will be needed. Innovations must be steered in a way that will not cause further problems. These realizations have led to the appearance and mainstreaming in STI policies around the world of such concepts as “Mission-Oriented STI policies,” “Transdisciplinary Research,” “Open Data and Open Science,” and “ELSI/RRI.” The following are some ways in which Japan is beginning to transform its STI in line with the needs of SDGs.

### ■ Mission-Oriented STI Policy

In responding to the SDGs and other social issues, R&D should be coherently directed



toward a common goal with major changes in socioeconomic systems. Mission-Oriented STI Policies are becoming increasingly common, most notably in EU's research and innovation framework program Horizon Europe. In a mission-oriented policy, government sets ambitious policy goals, utilizing not only R&D but also a variety of other policy tools, and promotes initiatives in collaboration with universities, research institutions, companies, and other stakeholders.

In Japan, the Cross-ministerial Strategic Innovation Promotion Program (SIP), led by the Cabinet Office, has been implemented since 2013.<sup>26</sup> It aims to promote interdisciplinary R&D ranging from fundamental studies to industrial applications, with industry-academia-government cooperation. To date, 23 projects have been carried out, among them the Automated Driving for Universal Services Project mentioned in the previous section.

There is also the Moonshot Research and Development Program<sup>27</sup> which sets ambitious goals for solving societal issues, and encourages the building of a portfolio for promoting R&D “without fear of failure.” In 2020, the first seven Moonshot Goals were decided, among them, “Moonshot Goal #2: Realization of ultra-early disease prediction and intervention by 2050” and “Moonshot Goal #5: Creation of the industry that enables sustainable global food supply by exploiting unused biological resources by 2050.” Each program will be supported for up to 10 years. Furthermore, the Sixth STI Basic Plan states that mission-oriented R&D programs and institutional reforms will be promoted.

### ■ Transdisciplinary Research

Many of today's social issues exemplified by the SDGs are complex and diverse, and cannot be addressed by a single scientific discipline. Not only do they require the collaboration of various disciplines in the humanities and social sciences as well as the natural sciences, they also require the knowledge of diverse stakeholders extending beyond the research community, including citizens, governments, and private companies. Therefore, “transdisciplinary research” that combines “interdisciplinarity” and “co-creation” approaches is attracting renewed attention.

In its June 2020 report,<sup>28</sup> the OECD's Global Science Forum (GSF) defines Transdisciplinary Research (TDR) as the “integration of academic researchers from different disciplines with non-academic participants in co-creating new knowledge and theory to achieve a common goal.” The report examines 28 projects (all related to SDGs in one way or the other) in various countries and regions as case studies of TDR methods and practices, including several Japanese examples related to disaster science, the environment, people's lives in southeast Asia, and mobility (**Table 2**).

<sup>26</sup> Cabinet Office, Cross-ministerial Strategic Innovation Promotion Program.  
[https://www8.cao.go.jp/cstp/panhu/sip\\_english/4-6.pdf](https://www8.cao.go.jp/cstp/panhu/sip_english/4-6.pdf) (accessed: 29.3.2021)

<sup>27</sup> Cabinet Office, Moonshot Research and Development Program.  
<https://www8.cao.go.jp/cstp/english/moonshot/top.html> (accessed: 29.3.2021)

<sup>28</sup> OECD Global Science Forum, “Addressing societal challenges using transdisciplinary research,” 2020.  
[http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/STP/GSF\(2020\)4/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/STP/GSF(2020)4/FINAL&docLanguage=En) (accessed: 29.3.2021)

**Table 2.** Japanese projects surveyed in the OECD TDR report (2020).

Source: Adapted from OECD Global Science Forum, "Addressing societal challenges using transdisciplinary research," 2020.

1.	<p>International Research Institute of Disaster Science (IRIDeS)<sup>29</sup></p> <ul style="list-style-type: none"> <li>• Main Institution: Tohoku University</li> <li>• Disciplines involved: Tsunami engineering; earth science; civil engineering; history; art history; disaster medicine; clinical psychology; economics; public policy.</li> <li>• Societal partners: Sendai city; Kesennuma city.</li> <li>• Summary: IRIDeS was established to create a new approach to disaster mitigation research, synthesizing lessons from the 2011 Great East Japan (Tohoku) Earthquake and Tsunami with the findings from different research fields related to disaster research and societal resilience. Its aim is to exploit learning for management of future disasters. The Institute was actively involved in organizing the UN World Conference on Disaster Risk Reduction in 2015 and co-organizes the biennial World BOSAI Forum.</li> </ul>
2.	<p>Japan-ASEAN Science, Technology and Innovation Platform / Collaboration Hubs for International Research Program (CHIRP/JASTIP)<sup>30</sup></p> <ul style="list-style-type: none"> <li>• Main Institution: Kyoto University.</li> <li>• Disciplines involved: Energy and material sciences; forestry; biotechnology; natural disaster-related sciences; anthropology; humanities and social science.</li> <li>• Societal partners: Inter-governmental organization; national and local government; private sector; civil society (e.g., grassroots associations and local communities).</li> <li>• Summary: JASTIP aims to help address social and environmental challenges in the ASEAN region by fostering STI collaboration between Japan and ASEAN countries. It is a collaborative platform that focuses on priorities agreed upon by ASEAN Member States such as energy and the environment, bio-resources and biodiversity and disaster prevention.</li> </ul>
3.	<p>Mobility Innovation project by Center of Innovation (COI, Mobility)<sup>31</sup></p> <ul style="list-style-type: none"> <li>• Main Institutions: Nagoya University; Toyota Motor Corporation.</li> <li>• Disciplines involved: Mechanical engineering; information science; urban planning; human health; sociopsychology; law.</li> <li>• Societal partners: Toyota Motor Corporation; Japan Ministry of Land, Infrastructure and Transport; Aichi Prefectural Government; Toyota City; Kasugai City; Nagoya City; Kota Town.</li> <li>• Summary: This project aimed to develop mobility technology to allow senior citizens in the ageing Japanese society to stay active and participate in their communities. The research plan emerged from discussions among Nagoya University, the Aichi Prefectural Government and Toyota Motor Corporation, and was then approved by the COI visionary team consisting of leaders in industry and academia.</li> </ul>

## ■ Open Science, Open Data

In recent years, increasing emphasis is put on the importance of “open data,” and “open science.”

Open data refers to data held by the government or private sector that is widely available free of charge and does not preclude its secondary use. In Japan, the release and utilization of national statistical survey data has been promoted in line with the government's e-government promotion (**Table 3**).

Open science refers to the release and sharing among researchers of the research data used in their research, as well as the resulting publication data. The rising costs of journal subscriptions, which are the knowledge base for academia, are squeezing the budgets of researchers and research institutions. The momentum for open science is gradually growing as open data and the handling of big data become more serious.

<sup>29</sup> International Research Institute of Disaster Science (IRIDeS). <http://irides.tohoku.ac.jp/eng/index.html> (accessed: 29.3.2021)

<sup>30</sup> Japan-ASEAN Science, Technology and Innovation Platform (JASTIP). <http://jastip.org/en/about/mission/> (accessed: 29.3.2021)

<sup>31</sup> Nagoya University COI Mobility Innovation Center. <http://www.coi.nagoya-u.ac.jp/en> (accessed: 29.3.2021)

**Table 3.** Major developments in Japan regarding openness of public data.

Source: Modified from a report by JST-CRDS.

Year	Event
2000	The "IT Basic Strategy" is formulated with the aim to realize e-government.
2012	"Open Government Data Strategy" is adopted, setting forth the principles: "Government shall actively release public data / Public data shall be released in machine-readable formats / the use of public information shall be encouraged for both commercial and non-commercial purposes / Specific measures shall be taken such as the prompt disclosure of public data that can be released, and results shall be steadily accumulated."
2012	"Open Data Promotion Consortium" is set up with the aim to do research on issues in open data promotion, and to further promotional and educational activities for open data. Reorganized into "Vitalizing Local Economy Organization by Open Data & Big Data" (VLED) in 2014.
2013	"Japan Open Data Charter Action Plan" is established.
2014	The website DATA.GO.JP is launched as a catalog of open public data.
2016	Decide to promote "Open Data 2.0" through Public-Private Partnership. The need for open data in tackling global challenges including SDGs is mentioned
2019	In a speech at the World Economic Forum Annual Meeting in Davos, Japan, Prime Minister Shinzo Abe proposes the concept of "Data Free Flow with Trust (DFFT)."

### ■ ELSI/RRI

In STI for SDGs, it is not only necessary to use science, technology and innovation to achieve specific SDGs, but also to ensure that the science, technology and innovation introduced do not hinder the achievement of other SDGs or have other negative impact. For example, while artificial intelligence (AI) and other digital technologies can contribute to more efficient use of energy, more effective allocation of resources, and better decision-making, there is also a danger that they will lead to increased unemployment and greater inequality due to the transformation of existing industries. Genetic diagnosis, gene therapy, use of medical data, genome editing, synthetic biology, use of personal data, and the development of nanomaterials can all contribute to the SDGs, but they also pose risks. ELSI (Ethical, Legal, and Social Issues) or RRI (Responsible Research and Innovation) perspectives are necessary to orient science and technology to reflect the expectations and needs of society, and to develop them while minimizing their negative impact.

The importance of ELSI was acknowledged in Japan's Fifth Science and Technology Basic Plan. More programs are promoting ELSI, such as the Moonshot R&D Program incorporating cross-disciplinary efforts for ELSI, the ELSI Program for Infectious Disease Research and Development of the Japan Agency for Medical Research and Development (AMED), and the various initiatives dedicated to ELSI by the Research Institute of Science and Technology for Society (RISTEX).<sup>32</sup> The challenge is to promote ELSI/RRI initiatives in a sustainable manner, as well as to form an organizational and human network to carry out these initiatives. The Association for the Promotion of Research Integrity (APRIN) founded in 2016 provides online educational materials on research ethics.<sup>33</sup>

### ■ Science-Policy-Society Interface: rethinking scientific advice

Scientific advice provided by scientists, engineers, doctors, and experts in the humanities and social sciences based on their expertise enable governments to formulate appropriate policies and make decisions. With regard to the ideal form of scientific advice, there have been efforts to create common norms and principles, mainly through the OECD's international research

<sup>32</sup> Research Institute of Science and Technology for Society (RISTEX). <https://www.jst.go.jp/ristex/en/index.html> (accessed: 29.3.2021)

<sup>33</sup> Association for the Promotion of Research Integrity (APRIN). <https://www.aprin.or.jp/en> (accessed: 29.3.2021)

project on scientific advice. In Japan, the issue has been discussed in the context of food safety, infectious diseases, and risk analysis of pharmaceuticals since the beginning of the 21st century, and the Great East Japan Earthquake in 2011 was a major incident bringing the issue of scientific advice to the fore.

In rethinking scientific advice, it is also crucial to consider its relationship with society. The importance of a “science-policy-society interface” has been repeatedly pointed out in the discourse on the SDGs.

The COVID-19 pandemic has exposed the limitations of the traditional scientific advisory systems in many countries. Currently, Japan is taking part in various international research projects to examine the response of scientific advice under the COVID-19 pandemic and to draw lessons for future crisis response (e.g., EScAPE,<sup>34</sup> OECD/Global Science Forum's “Mobilising science in times of crisis: lessons learned from COVID-19”<sup>35</sup>).

### ■ Capacity development

Achieving the SDGs calls for everyone to acquire a new mindset and knowledge and to make action. Primary to higher education, lifelong learning (or recurrent education), and on-the-job training will all be important.

The Sixth STI Basic Plan positions capacity development to support a new society as one of its three pillars, and places particular emphasis on supporting young researchers to take on challenges. COVID-19 has accelerated the spread of online education. As part of the effort to promote digital transformation (DX), teaching programming has become a mandate in elementary schools in 2020.

### ■ Gender in STI

Women in STI are critical to achieving the SDGs. According to UNESCO's 2019 data, women account for less than 30% of researchers worldwide, and even less when limited to East Asia. In addition, according to the Gender and STI working group established in the UN IATT, women accounted for only 17.1% of the applicants for patents handled by the World Intellectual Property Organization (WIPO) in 2019.<sup>36</sup> There are also studies that show that the impact of COVID-19 was greater for female researchers (especially younger ones) than for males.<sup>37</sup>

Japan is lagging behind in gender equality (e.g. Japan's progress in SDG 5 is graded as “Major Challenges Remain” in the Sustainable Development Report 2020), and this issue is upheld in one of the priorities in the national SDGs Action Plan. The STI community in Japan is also taking measures to mitigate the current gender inequality. Only 25.9% of researchers among full-time faculty at universities<sup>38</sup> and 16.9% of all researchers including in the private sector<sup>39</sup> in

<sup>34</sup> Evaluation of Science Advice in a Pandemic Emergency (EScAPE). <https://escapecovid19.org/> (accessed: 29.3.2021)

<sup>35</sup> OECD Global Science Forum. <http://www.oecd.org/sti/inno/global-science-forum.htm> (accessed: 29.3.2021)

<sup>36</sup> Commission on the Status of Women. [https://sustainabledevelopment.un.org/content/documents/26211Concept\\_Note\\_Final.pdf](https://sustainabledevelopment.un.org/content/documents/26211Concept_Note_Final.pdf) (accessed: 29.3.2021)

<sup>37</sup> Nature Index, “The decline of women's research production during the coronavirus pandemic,” 2020. <https://www.natureindex.com/news-blog/decline-women-scientist-research-publishing-production-coronavirus-pandemic> (accessed: 29.3.2021)

<sup>38</sup> FY2020, according to a survey by MEXT, cited in the Sixth STI Basic Plan.

<sup>39</sup> FY2019, according to Ministry of Internal Affairs and Communications, cited in the Sixth STI Basic Plan.

Japan are female. The Sixth STI Basic Plan sets goals to increase the employment of female researchers including in leadership positions, as well as improving working conditions to make them more inclusive.

## 1.5 Impact and lessons of COVID-19

The COVID-19 pandemic has had a significant impact on progress towards the SDGs, along with a severe blow to the global economy. Even those indicators that were improving, such as poverty rates, are showing signs of deterioration. There are also gender and country disparities in the magnitude of the impact from the pandemic, and there are concerns that vulnerable populations will be increasingly left behind.

COVID-19 is a zoonotic disease in which the virus is transmitted from animals to humans and from humans to animals. The prevalence of zoonotic diseases has been increasing in recent years and is said to be due to anthropogenic causes such as agricultural intensification, overexploitation of wildlife, and climate change.<sup>40</sup> Other issues such as widening economic disparities, increasing urban slums, lack of access to medical equipment and facilities, and delays in universal health care (UHC) have also contributed to the worsening of pandemics, and are none other than the goals and targets of the SDGs. Therefore, moving closer to achieving the SDGs will also mean creating a world that is resilient to zoonotic diseases. There is a strong need to pursue “One Health,” in which public health, animal health, plant health and the health of the environment are dealt with holistically.<sup>41</sup>

In Japan, as of the end of March 2021, the number of confirmed COVID-19 cases was over 460,000, with more than 9,000 deaths. Below are some of the aspects with which Japan has struggled during the pandemic (excerpt from a forthcoming paper by The Engineering Academy of Japan, courtesy of MORIMOTO Koichi).

- There have been three waves of peak infections. The government has declared a state of emergency twice, in April 2020 and January 2021.
- From an early stage, the government has been asking people to avoid “closed spaces, crowded places, and close-contact settings (3Cs),” as well as encouraging other behavioral changes (wearing masks, hand washing/sanitizing, working remotely). In February 2021, Japan enacted a law to strengthen preventive measures and to further provide support to businesses and local governments.
- Information and communication technology (ICT) proved to be highly effective in accurately assessing behavioral changes, detecting the spread of infection, and understanding the propagation mechanisms of novel coronaviruses (e.g., visualization

<sup>40</sup> A report by UNEP lists the following human-mediated factors that are “most likely driving the emergence of zoonotic diseases”: “1) increasing human demand for animal protein; 2) unsustainable agricultural intensification; 3) increased use and exploitation of wildlife; 4) unsustainable utilization of natural resources accelerated by urbanization, land use change and extractive industries; 5) increased travel and transportation; 6) changes in food supply; and 7) climate change.” UNEP, “Preventing the next pandemic – Zoonotic diseases and how to break the chain of transmission.” <https://wedocs.unep.org/bitstream/handle/20.500.11822/32860/ZPKMEN.pdf?sequence=1&isAllowed=y> (accessed: 29.3.2021)

<sup>41</sup> World Health Organization, “One Health.” <https://www.who.int/news-room/q-a-detail/one-health> (accessed: 29.3.2021)

of virus spread by the supercomputer Fugaku). The use of ICT and big data is raising concerns about privacy and appropriate use of simulations in decision-making.

- PCR testing in Japan puts emphasis on countering infection clusters, suppressing infection by tracing the route of infection and close contacts. From March 2021, PCR testing was expanded to include unspecified asymptomatic persons.
- In February 2021, the first vaccine was approved, and vaccination of medical workers started. Vaccination of senior citizens started in April.
- As part of global cooperation in tackling the pandemic, Japan has participated in the formation of the COVAX Facility and has pledged to contribute financially.

The way out from the pandemic requires a transformation of society, which is also required by the SDGs. The SDGs Action Plan of 2021 has added infectious disease control and preparedness for the next crisis as a priority.

## Chapter 2

# Multi-stakeholder STI for SDGs Initiatives in Japan

A wide variety of stakeholders participate in Japan's STI for SDGs. This chapter explores various activities undertaken by local governments, universities, research institutes, industry, and NGO/NPOs in Japan.

## 2.1 Regional revitalization, local Initiatives, and “SDGs Future Cities”

Japan faces a sharp population decline and extreme population aging, most prominently in local municipalities, and “regional revitalization”<sup>42</sup> has been a priority national strategy. Thus, SDGs in Japan are strongly linked to the sustainability of rural economies, and to regional revitalization.

At the meeting of the UN High-Level Political Forum (HLPF) in July 2018, the heads of local governments around the world, including the Mayor of Kitakyushu City of Japan, gathered to declare that not only national governments but also local governments would play proactive roles for the realization the SDGs.

Under its “Comprehensive Strategy for Overcoming Population Decline and Vitalizing Local Economy,”<sup>43</sup> the Japanese government established a Public-Private Partnership Platform for Regional Revitalization SDGs to (1) promote the spread of the SDGs among local governments, (2) promote the model projects of local governments for achieving the SDGs, and (3) promote private sector participation.

Each year since 2018, the national government has designated about 30 municipalities as “SDGs Future Cities” (2020's Future Cities are shown in **Figure 9**). Each candidate SDGs Future City decides its priority goals and formulates an action plan that is reviewed from social, economic, and environmental perspectives. About 10 of these municipalities are selected as “SDGs Models of Local Governments” and are provided subsidies for cross-sectional initiatives that can potentially be rolled out to other areas.

How to effectively apply STI in local SDGs is a challenge that might be called a “last mile” problem in the domestic sense. Various measures have been taken to foster STI utilization for local SDGs as mentioned below.

<sup>42</sup> Here, “region” refers to subnational rather than international units.

<sup>43</sup> Cabinet Office, “Council on Overcoming Population Decline and Vitalizing Local Economy,” December 2019. [https://japan.kantei.go.jp/98\\_abe/actions/201912/\\_00030.html](https://japan.kantei.go.jp/98_abe/actions/201912/_00030.html) (accessed: 31.3.2021)



## SDGs Future Cities (SDGs model projects)

City	Proposal title
Ishinomaki City, Miyagi	Ishinomaki - Aiming to become a city of the future after being one of the worst disaster-stricken cities: Sustainable urban development supported by green slow mobility and "Otogaisama (the thanks is mutual)"
Toshima Ward, Tokyo	Departure from being a city that could potentially vanish: Challenge to be an "international city of art and culture," which can develop sustainably
Kanazawa City, Ishikawa	Realization of Kanazawa as the world's hub of interaction: A city where citizens and visitors co-create happiness
Inabe City, Mie	Green creative Inabe: Delivering the casual promotion of the SDGs to the world from "Bustling Forest," a green commercial infrastructure facility
Kameoka City, Kyoto	"Kameoka Kiri Art Cultivation" multiplied by X: Sustainable Development and Innovation Hub
Osaka City, Osaka	Toward the realization of an "advanced SDGs city" with the Expo 2025 Osaka, Kansai as a reinforcing impact
Tondabayashi City, Osaka	"Tondabayashi version" of a bright future society design based on multi-partnerships using the SDGs as a common language
Kurashiki City, Okayama	Creation of a "sustainable life in a watershed area" in which diverse human resources play active roles and coexist with nature: The development of the Takahashi river basin is the development of Kurashiki City
Matsuyama City, Ehime	Matsuyama City, a future sightseeing city that makes everyone smile: City connecting the islands, towns, and mountains of the Seto Inland Sea
Ishigaki City, Okinawa	Future created by nature and culture: Ishigaki, an island that protects, connects and serves

## Other SDGs Future Cities

City	Proposal title
Iwate Town, Iwate	Construction and demonstration of a model for improving the sustainability of a town by employing the triple bottom line: SDGs sister city × Living lab
Sendai City, Miyagi	Promotion of "Sendai, a disaster-prevention and environmental city"
Tsuruoka City, Yamagata	Tsuruoka, "a vivid, creative and traditional city" where the cultures of forest, food and agriculture exist in harmony with advanced life sciences
Kasukabe City, Saitama	Kasukabe, a city where lives are passed on to the second, third and subsequent generations: Generation circulation project to be communicated to the future
Sagamihara City, Kanagawa	Sagamihara SDGs concept in which the city and nature support each other, and the people support each other, to live together
Kaga City, Ishikawa	Sustainable city by becoming a smart city through public-private collaboration
Nomi City, Ishikawa	Nomi City, to be an SDGs Future City that the people can feel is the most comfortable place to live in Japan
Omachi City, Nagano	Sustainable town concept of "Shinano Omachi where water springs out" developed through SDGs co-creation partnership
Gifu	Making Gifu a sustainable "province of clear streams" driven by the SDGs
Fuji City, Shizuoka	Fuji City, opening up a bright future with Mount Fuji
Kakegawa City, Shizuoka	Sustainable urban development through civic collaboration
Okazaki City, Aichi	Sustainable castle town Okazaki with "twinkling <i>Minamo</i> (meaning "water surface" and also "everyone as well")" and based on public-private cooperation: Otogawa riverfront area
Mie	Future of Mie to be created in cooperation with the younger generation: Development of a sustainable society
Konan City, Shiga	Realization of an SDGs Future City of Konan, developed through mutual and subtle support [stadwerke concept]
Toyonaka City, Osaka	Toyonaka, an SDGs Future City: City where tomorrow is brighter
Akashi City, Hyogo	Akashi, an SDGs City with a safe future: City made friendly to all people forever by everyone
Higashiroshima City, Hiroshima	International academic and research city of Higashiroshima that is rich in nature and takes on the challenge to become an SDGs Future City
Mitoyo City, Kagawa	The sea, mountains and city in the Setouchi area: Multipolarized network type Mitoyo formation project for a wide and rich rural city
Tosa Town, Kochi	Tosa Town, a town with sustainable water sources: The people's rich activities nurture water that enriches the "world"
Munakata City, Fukuoka	SDGs Future City Munakata where the people live with a "world heritage sea"
Tsushima City, Nagasaki	Treasure island of self-reliance and circulation: Circular economy island Tsushima
Minamata City, Kumamoto	Development of a vibrant city where everyone feels happy and smiles
Kagoshima City, Kagoshima	Kagoshima City, a sustainable SDGs Future City that coexists and develops with the "active volcano, Sakurajima"

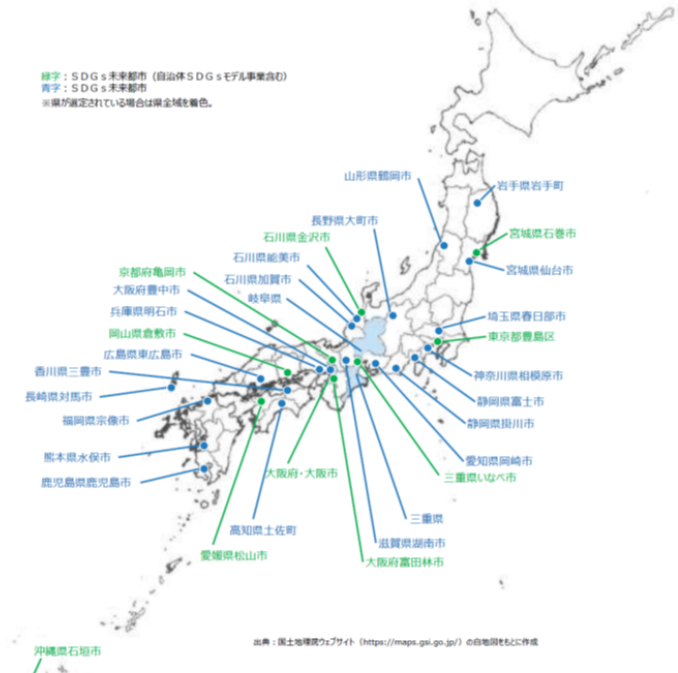


Figure 9. Cities selected as SDGs Future Cities and local government SDGs model projects in 2020.

Source: [https://www.kantei.go.jp/jp/singi/tiiki/kankyo/teian/2020sdgs\\_pdf/sdgs\\_r2futurecity\\_press0701.pdf](https://www.kantei.go.jp/jp/singi/tiiki/kankyo/teian/2020sdgs_pdf/sdgs_r2futurecity_press0701.pdf) (accessed: 31.3.2021),

Translated by the author.

Local universities and national colleges of technology (commonly referred to as *kōsen*, see section 2.2) are expected to play important roles in regional revitalization. The Center of Innovation (COI) program<sup>44</sup> launched in 2013 by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), identifies innovative research and development themes and fosters industry-academia collaboration. This program promotes projects in which local governments and citizens work together to solve regional issues, as is the case of Hirosaki University's COI shown in the Box below.

<sup>44</sup> Japan Science and Technology Agency, Center of Innovation (COI) Program. <https://www.jst.go.jp/tt/EN/platform/coi.html> (accessed: 31.3.2021)

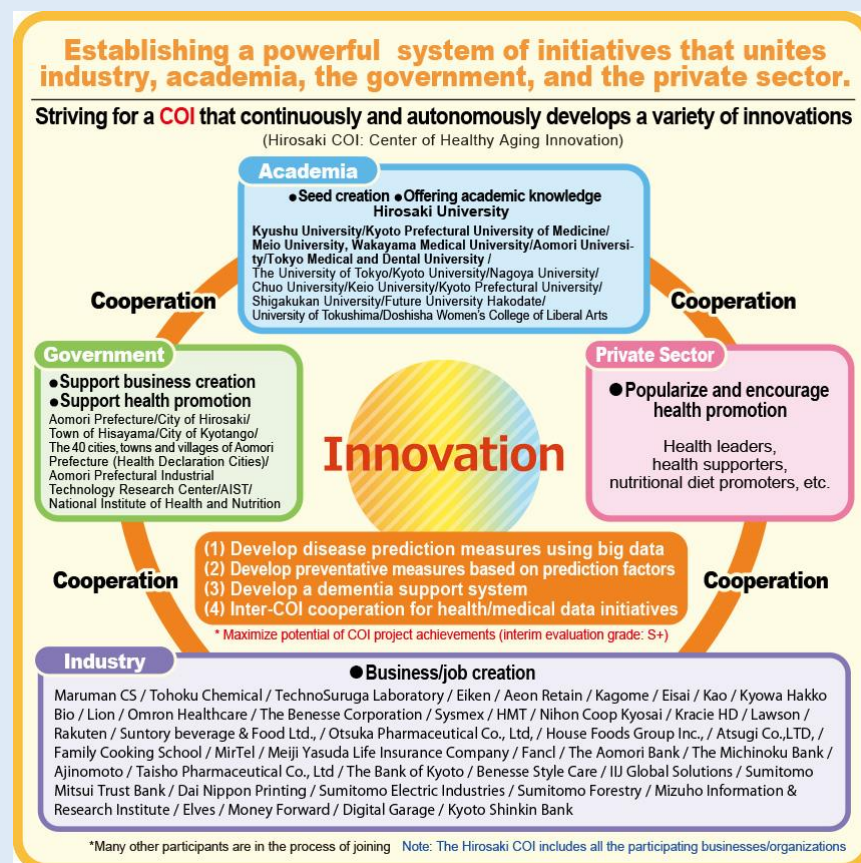


### Box: Overcoming low life expectancy using big health data (Hirosaki University's COI)

Aomori Prefecture has the lowest average life expectancy among the prefectures in Japan. Hirosaki University, a national university in Aomori, was selected as a Center of Innovation (COI) in 2013. This program aims to “create a healthy society with long life expectancy by using big health data and the latest science.”

The program brings together academia, the government, and private sectors with Hirosaki University at the center. By analyzing and utilizing “big health data” accumulated over ten years, the university is building up its know-how for enabling the prefecture to address its low life expectancy, and is working to contribute to future healthy and long-lived societies of Japan, Asia, and the world.

In 2019, with support from the Japan International Cooperation Agency (JICA), the Hirosaki University COI demonstrated its “QOL health checkup” in Vietnam as part of its overseas transfer activities.



**Figure 10.** System of initiatives at the Hirosaki University COI.

Source: Hirosaki University COI. [https://coi.hirosaki-u.ac.jp/en/?page\\_id=52](https://coi.hirosaki-u.ac.jp/en/?page_id=52) (accessed: 31.3.2021)

To bring the fruits of STI to rural areas, technological seeds need to be matched with demand by some mechanisms of brokering. After the Great East Japan Earthquake in 2011, JST introduced a matchmaking system (Matching Planners) to help small and medium-sized enterprises that were devastated in the disaster. This resulted in the utilization of various technologies owned by universities.

### Box: Regional deployment of research outcomes (oyster farming technology using an iron device)

The Sanriku coast renowned for oyster cultivation was devastated by the Great East Japan Earthquake. KOJIMA Akira, who worked at the National Institute of Technology, Gunma College (currently principal of the International Industrial Technical College) developing water purification technology using an iron device combining iron and carbon materials, believed that this technology could contribute to the growth of phytoplankton, a food of oysters, and consulted with a JST Matching Planner.<sup>45</sup> Subsequently, with support from JST, he started joint research with Ishii Corporation (in Gunma Prefecture) and the Yamada Town Fisheries Cooperative Union in Iwate Prefecture. Eventually, use of the iron device resulted in the realization of oyster farming with high-quality oysters with a 30% increased weight and 70% more glycogen, the umami taste, compared with previous oysters.

The technology was demonstrated in other cities and towns, and proved to be effective. It has received attention from overseas as well. The iron device is a safe and sustainable technology that consists only of natural materials and can be customized according to the environment of each area. This case illustrates the potential for regional SDGs activities to be widely utilized by matching the results of research institutes to local needs.



Iron device



Cultivation of high-quality oysters in a short period of time

Source: Japan Science and Technology Agency, "Science Window" (Article in Japanese), [https://scienceportal.jst.go.jp/gateway/sciencewindow/20181017\\_w05/](https://scienceportal.jst.go.jp/gateway/sciencewindow/20181017_w05/) (accessed: 31.3.2021)

Municipalities such as Kitakyushu City, Shimokawa Town, and Toyama City are proactively disseminating information about their SDGs activities in the form of voluntary local reviews (VLR).<sup>46</sup>

## 2.2 Universities and national colleges of technology (*kōsen*)

Universities in Japan are actively working on the SDGs. In addition to promoting individual projects, more universities are incorporating the SDGs into their university-wide action principles. University activities can be categorized as follows.

### 1. Solving problems through creation and bridging of research outcomes:

Contributing to society through research is an important role of universities. In addition, there is a growing movement to link research content and results to the SDGs, to use the SDGs as a common language, and to stimulate collaboration with various stakeholders, including industry-academia collaborations. Take for example, the Future Society Initiative (FSI) launched by the University of Tokyo in 2017 which acts to visualize and disseminate research and educational activities of SDGs-registered projects conducted within the university that

<sup>45</sup> A Matching Planner collects information on the research outcomes and patents of universities (university seeds) in cooperation with local industry-academia-government networks and proposes suitable university seeds for the technical challenges (corporate needs) that companies face.

<sup>46</sup> Institute for Global Environmental Strategies (IGES), Online Voluntary Local Review (VLR) Lab. <https://www.iges.or.jp/en/projects/vlr> (accessed: 31.3.2021)

contribute to the 17 SDGs.<sup>47</sup> As of March 2021, there are 199 registered projects. This initiative is expected to serve as a mechanism leading to synergy among research projects within the university and to the creation of social values. Similar efforts to visualize university activities utilizing the SDGs are also carried out at Okayama University<sup>48</sup> and Kochi University.<sup>49</sup>

## 2. Development of problem-solving capacity:

There are universities working to develop human resources by incorporating the SDGs into their curricula as educational materials so that young students and researchers can contribute to the achievement of the SDGs. These universities focus on developing capacity to address the SDGs, for example, by designing their curricula in such a manner that students are required to work on the resolution of social issues through field work and by providing them with comprehensive training to develop their design thinking abilities, problem-solving abilities, and communication skills. Examples of such efforts include those of the Kanazawa Institute of Technology, which received a Deputy-Chiefs' Award, one of the first Japan SDGs Awards presented by the SDGs Promotion Headquarters, and Okayama University, which received an SDGs Partnership Award.

## 3. Cooperation with and contribution to local communities:

In order to contribute to local communities, universities take the lead in resolving local issues and conduct outreach activities in addition to offering information and services. For example, Kochi University has committed itself to take on the challenge becoming a “Super Regional University (SRU)” to achieve the SDGs. It promotes education, research, and regional contribution under the concept “From Regionality to Globality and from Globality to Regionality” and as a “University Based on Regional Community Collaboration.” The activity of Hirosaki University's COI described earlier constitutes another good example of regional SDGs activity. In addition, Okayama University and the Kanazawa Institute of Technology, among others, have also conducted a large number of projects in partnership with local communities.

### **Box: Improving the sustainability of sewage treatment through industry-academia-government collaboration (Kochi University)**

Kochi Prefecture is the third worst prefecture in Japan in terms of the rate of sewage treatment. In addition, as the prefecture faces a population decline and severe fiscal conditions, the increase of sewage treatment facilities and the improvement of their sustainability are local challenges.

Through industry-government-academia collaboration, Kochi University successfully developed and achieved the practical application of new sewage treatment technology for automated control of wind volume and circulatory flow rate with dissolved oxygen level meters installed in a reaction tank. At the Kanan City Noichi Water Purification Center, this technology demonstrated that it successfully reduces electricity usage by one-third, processing time by half, and

<sup>47</sup> The University of Tokyo, SDGs Projects. <https://www.u-tokyo.ac.jp/adm/fsi/en/projects/sdgs/index.php> (accessed: 31.3.2021)

<sup>48</sup> Okayama University. <https://sdgs.okayama-u.ac.jp/en/> (accessed: 31.3.2021)

<sup>49</sup> Kochi University. (Japanese page) <http://www.kochi-u.ac.jp/SDGs/index.html> (accessed: 31.3.2021)

consequently reduces processing costs. Based on this result, the technology was introduced in two other locations within the city and has been deployed to other municipalities as well, leading to the improved sustainability of sewage treatment in rural cities with declining populations.

Based on the above project, Kochi University, together with its collaborative organizations, won an STI for SDGs Excellent Practice Award in 2019.

Source: JST, STI for SDGs Award Screening Results (Kochi University, etc.: Excellent Practice Award), [https://www.jst.go.jp/sis/co-creation/sdgs-award/2019/result\\_2019\\_yusyu\\_3.html](https://www.jst.go.jp/sis/co-creation/sdgs-award/2019/result_2019_yusyu_3.html) (accessed on February 22, 2021)

A national college of technology, or *kōsen*, is a higher education institution dedicated mainly to engineering education.<sup>50</sup> A course of study usually covers five years with students enrolling from age 15. There are 55 national colleges of technology in Japan, producing highly-skilled engineers and researchers for both industry and academia. The National Institute of Technology, which oversees the 55 colleges, is working on projects to transfer this education system internationally (such as to Mongolia and Thailand).

## 2.3 National research and development agencies

National research and development agencies include research institutes covering a wide range of fields, from natural sciences to social sciences, and they are actively contributing to the achievement of the SDGs. For example, the National Agriculture and Food Research Organization (NARO) is promoting research and development by integrating the SDGs with the realization of an agriculture and food version of Society 5.0.<sup>51</sup> The Japan Aerospace Exploration Agency (JAXA) is using earth observation satellites to monitor disasters such as tsunamis and floods, and to provide information on air pollution.<sup>52</sup> The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) conducts oceanographic research and technology development to solve plastic pollution in the ocean, research on the marine environment in relation to climate change, and research on earthquake and tsunami prediction.<sup>53</sup>

### Box: Association for National Research and Development Agencies

The Association for National Research and Development Agencies was established in 2016 to enhance the R&D capabilities and research promotion capabilities of National Research and Development Agencies through their mutual cooperation in R&D, human resource exchange and development, and agency management. Currently, it has 27 National Research and Development Agencies as members.

In order to promote STI for SDGs, tight collaboration between National Research and Development Agencies needs to be realized. To widely share each agency's efforts for SDGs and discuss how they can further contribute, the association began to organize symposiums from 2019.<sup>54</sup>

<sup>50</sup> National Institute of Technology, "What is KOSEN?" <https://www.kosen-k.go.jp/english/what/> (accessed: 31.3.2021)

<sup>51</sup> National Agriculture and Food Research Organization (NARO), "Achievement of SDGs through Society 5.0 in Agriculture and Food Industry." (webpage in Japanese) <http://www.naro.affrc.go.jp/project/society5-sdgs/index.html> (accessed: 31.3.2021)

<sup>52</sup> Japan Aerospace Exploration Agency (JAXA), "JAXA's Activity for Sustainable Development Goals (SDGs)." [https://www.jaxa.jp/about/iso/sdgs/pdf/jaxa\\_sdgs.pdf](https://www.jaxa.jp/about/iso/sdgs/pdf/jaxa_sdgs.pdf) (accessed: 31.3.2021)

<sup>53</sup> Japan Agency for Marine-Earth Science and Technology (JAMSTEC), JAMSTEC's practices for SDGs. <http://www.jamstec.go.jp/sdgs/e/> (accessed: 31.3.2021)

<sup>54</sup> JST Science Portal, Introduction of Cases of Science, Technology, and Innovation for the SDGs. (webpage in Japanese) [https://scienceportal.jst.go.jp/explore/reports/20191226\\_01/index.html](https://scienceportal.jst.go.jp/explore/reports/20191226_01/index.html) (accessed: 31.3.2021)

## 2.4 Industry

Industry is shifting towards sustainable corporate management that aims to increase corporate value by linking the SDGs with management. As the “SDG Compass” issued by Global Reporting Initiatives (GRI), UN Global Compact (UNGC) and World Business Council for Sustainable Development (WBCSD) shows, this new style of corporate management means mainstreaming the ethos of “three-way satisfaction” (the idea that business should benefit the local community as well as the seller and the client, as mentioned in Chapter 1), and regarding the SDGs as new business opportunities to be developed as core business undertakings.

The Japan Business Federation, or Keidanren,<sup>55</sup> incorporated a policy for achieving the SDGs through the realization of Society 5.0 into its Charter of Corporate Behavior, revised in November 2017, urging companies to make further efforts to contribute to the realization of a sustainable society through innovation in cooperation with diverse stakeholders.

Industry associations have placed SDGs on their main agenda. The Japan Chemical Industry Association (JCIA) established a taskforce in 2017 to examine how the chemical industry can contribute to the SDGs, resulting the report, “Chemical Industry’s Visions toward Sustainable Development”.<sup>56</sup> In addition to putting forward an overall vision of chemical industries contribution to the SDGs, JCIA shares case studies of activities by its member companies.<sup>57</sup> Many Japanese companies are formulating their own sustainability policies and targets, including SDGs, and are disclosing specific examples of their SDG initiatives in their integrated reports.

Not only large corporations but also many small- and medium-sized enterprises and venture companies have begun to address societal challenges as their core business. For example, Euglena Co., Ltd., a bio venture company founded in 2005 originating from the University of Tokyo, contributes to the SDGs by implementing a management philosophy of “making people and the earth healthy,” through the commercialization of biofuels and health foods derived from *Euglena*.<sup>58</sup> JEPLAN, Inc. utilizes polyester recycling technology to create a clothing recycling society in which residents as well as retail stores, are involved.<sup>59</sup> Japan Food Ecology Center, Inc., which won one of the second Japan SDGs Awards (awarded by the Prime Minister), has developed fermented feed using discarded foods and works to reduce food loss by establishing a food-recycling society in cooperation with local swine farmers.<sup>60</sup> The Kanto Bureau of Economy, Trade and Industry<sup>61</sup> and the Kansai Bureau of Economy, Trade and Industry,<sup>62</sup> among others, publish some SDGs-related efforts made by small- and medium-sized enterprises on their websites.

<sup>55</sup> Keidanren, KeidanrenSDGs. <https://www.keidanrendsgs-world.com/> (accessed: 31.3.2021)

<sup>56</sup> Japan Chemical Industry Association (JCIA), Sustainability Vision. <https://www.nikkakyo.org/english/sustainability> (accessed: 7.4.2021)

<sup>57</sup> Japan Chemical Industry Association (JCIA), SDGs Case Studies (webpage in Japanese). <https://www.nikkakyo.org/sdgs/cases/page/new> (accessed: 7.4.2021)

<sup>58</sup> Euglena Co., Ltd., <https://www.euglena.jp/companyinfo/sustainability/> (accessed: 2.4.2021)

<sup>59</sup> JEPLAN, Inc., <https://www.jeplan.co.jp/en/> (accessed: 2.4.2021)

<sup>60</sup> Japan Food Ecology Center, Inc., <https://www.japan-fec.co.jp/english/index.html> (accessed: 2.4.2021)

<sup>61</sup> Kanto Bureau of Economy, Trade and Industry, “Introduction of Some Preceding Cases of Small- and Medium-Sized Companies, etc. Engaged in the SDGs,” (webpage in Japanese) [https://www.kanto.meti.go.jp/seisaku/sdgs/sdgs\\_senshinjirei.html](https://www.kanto.meti.go.jp/seisaku/sdgs/sdgs_senshinjirei.html) (accessed: 2.4.2021)

<sup>62</sup> Kansai Bureau of Economy, Trade and Industry, “List of SDGs-Contributing Activities Conducted in Kansai,” (webpage in Japanese) <https://www.kansai.meti.go.jp/2kokusai/SDGS/businessnetwork/jirei.html> (accessed: 2.4.2021)



## 2.5 Investors and financial institutions

SDGs also provide responsibilities and opportunities for investors and financial institutions. One of the major trends in private sector investment is ESG investment, which is investment activity that incorporates the perspectives of the environment, society, and governance. ESG investment has spread since the United Nations published the Principles for Responsible Investment (PRI) in 2006, and the number of signatories to the PRI has exceeded 3,000 and continues to increase.

In 2018, the Japanese Bankers Association revised its Code of Conduct, which states the norms and ethics for bank officers, and declared one of its missions to be “Duties toward realization of a sustainable society.”<sup>63</sup>

In 2017, the Government Pension Investment Fund (GPIF) revised its Investment Principles to include consideration of ESG factors among their stewardship responsibilities.<sup>64</sup> Local banks play a role in regional revitalization by providing financial products and services that support businesses contributing to the resolution of social issues and to support start-ups. All of the above serves as a strong drive towards the promotion of SDGs, since ESG components have a lot in common with SDGs.

SDGs bonds meeting the criteria of Green Bond Principles, Social Bond Principles, and Sustainability Bond Guidelines, have been increasingly issued in recent years. According to a survey by the Japan Securities Dealers Association,<sup>65</sup> the number (and total amount) of SDGs bonds issued increased from 3 (45 billion yen) in 2016 to 146 (2.1 trillion yen) in 2020. Universities have started to invest in SDGs activities: in October 2020, the University of Tokyo issued its first social bonds (university bonds) totaling 20 billion yen and they were sold out on the first day.

## 2.6 NPOs and civic groups

Many NPOs and civic groups are working to solve specific issues related to the SDGs, such as environmental, human rights, and educational issues. It is important that civic groups and NPOs actively participate in discussions on specific solutions for local issues.

The SDGs Civil Society Network (SDGs Japan), a network of such groups, was established in 2016 to connect individual activities through a network, disseminate policy proposals for achieving the SDGs, and promote awareness about the SDGs.<sup>66</sup> As of January 2021, there were 135 groups in SDGs Japan. Some members of SDGs Japan have participated in the government’s SDGs Promotion Roundtable, providing input from the civil society’s viewpoint.

<sup>63</sup> Japanese Bankers Association, Code of Conduct. <https://www.zenginkyo.or.jp/en/conduct/> (accessed: 2.4.2021)

<sup>64</sup> Government Pension Investment Fund, ESG Report 2017. [https://www.gpif.go.jp/en/investment/esg\\_report\\_2017\\_en.pdf](https://www.gpif.go.jp/en/investment/esg_report_2017_en.pdf) (accessed: 2.4.2021)

<sup>65</sup> Japan Securities Dealers Association, “Issuance of SDGs Bonds.” (webpage in Japanese) <https://www.jsda.or.jp/sdgs/hakkou.html> (accessed: 2.4.2021)

<sup>66</sup> Japan Civil Society Network on SDGs. <https://www.sdgs-japan.net/en> (accessed: 2.4.2021)

## Chapter 3

# International Cooperation by Japan

International cooperation in STI for SDGs is essential for achieving the SDGs on a global scale. It also has national importance with regard to science and technology diplomacy. In this chapter, we briefly overview Japan's global activities in STI for SDGs.

### ■ Japan's international cooperation in STI for SDGs

As seen in Chapter 1, international cooperation in STI for SDGs has been discussed in the Advisory Board for Promoting Science and Technology Diplomacy, established by the Minister for Foreign Affairs in July 2014. The Board published a report "Recommendation for the Future: STI as a Bridging Force to Provide Solutions for Global Issues"<sup>67</sup> in 2017, which recommends the Japanese government to make the following contributions in STI for SDGs:

1. Change through Innovation: Global Future Creation through Society 5.0  
While aiming for Society 5.0, Japan must collaborate with other countries in this effort and thereby contribute to the achievement of the SDGs.
2. Grasp and Solve: Solution Enabled by Global Data  
Data collection and utilization must be promoted, by making most of big data infrastructure such as DIAS<sup>68</sup> (Japan's data infrastructure integrating and accumulating various types of large-scale data, including satellite observations).
3. Link across Sectors, Unite across the Globe  
R&D must be linked to commercialization to meet local needs. Promotion of new public private partnerships at the global level is necessary.
4. Foster Human Resources for STI for SDGs.  
The development of human resources for STI for SDGs should continue to be a major pillar of policy, both in Japan and abroad.

The Advisory Board also compiled "Recommendations towards TICAD7: Achieving an Innovation Ecosystem together with Africa"<sup>69</sup> expressing a commitment to strengthening cooperation with African countries. Reviewing the progress of STI cooperation with Africa in the past few years, the report proposes to strengthen efforts to support development of STI for SDGs roadmaps, human resources, and the implementation of ICT. The next TICAD8 (scheduled for

<sup>67</sup> Advisory Board for Promotion of Science and Technology Diplomacy, chaired by the Science and Technology Advisor to the Minister for Foreign Affairs of Japan, Recommendation for the Future: STI as a Bridging Force to Provide Solutions for Global Issues," 2017. <https://www.mofa.go.jp/files/000255801.pdf> (accessed: 22.3.2021)

<sup>68</sup> The University of Tokyo, Data Integration & Analysis System (DIAS). <https://diasjp.net/en/> (accessed: 22.3.2021)

<sup>69</sup> Ministry of Foreign Affairs, "Submission of Recommendation towards TICAD7 by Science and Technology Advisor to the Minister for Foreign Affairs," March 14, 2019. [https://www.mofa.go.jp/press/release/press4e\\_002617.html](https://www.mofa.go.jp/press/release/press4e_002617.html) (accessed: 2.4.2021)

2022 in Tunisia) is regarded as an important milestone for the deployment of Japan's STI for SDGs activities in Africa.

At the G20 Osaka Summit held in 2019, the G20 sent out strong messages on various issues such as rule-making for the digital economy, including "Data Free Flow with Trust," the sharing of a vision for measures against ocean plastic waste, and the empowerment of women.<sup>70</sup> Also, guiding principles for STI for SDG roadmaps were compiled into an annex of the G20 Osaka Leader's Declaration, thereby helping to build momentum for roadmap activities.<sup>71</sup>

The Sixth STI Basic Plan also emphasizes the importance of international collaboration, in addition to strengthening international competitiveness in light of rapidly changing geopolitics. The plan calls for strengthening brain circulation, a long-standing issue for the STI community in Japan, strengthening support for international joint research between industry and academia, and promoting international STI for SDGs activities. It also calls for the establishment of guidelines for international data sharing and research integrity.

With developing countries, Japan has undertaken a variety of projects. The World Bank, drawing in part on the OECD database, estimates the total amount of Official Development Assistance (ODA) disbursed worldwide for STI.<sup>72</sup> According to its report, concessional finance for STI is about US\$10 billion to over US\$20 billion per year, equivalent to 6-10% of total concessional financing by DAC member states, multilateral organizations and other countries. In the same estimate by the World Bank, Japan spent nearly US\$2 billion on the cross-sector of ODA and STI (in 2017).

The following are some of the international programs in developing countries related to STI for SDGs.

#### ■ ASEAN University Network/Southeast Asia Engineering Education Development Network (AUN/SEED-Net)

AUN/SEED-Net<sup>73</sup> was established in 2001 as a sub-network of the ASEAN University Network (AUN). It is supported by the Japan International Cooperation Agency (JICA) and is composed of 26 leading institutions in engineering fields from 10 ASEAN countries and 14 Japanese universities.

AUN/SEED-Net aims to "nurture internationally competitive personnel with multicultural awareness through academic cooperation among leading higher education institutions in the field of engineering in ASEAN and Japan" and to "advance engineering education and research capacities of leading higher education institutions in the region through collaboration and solidarity

<sup>70</sup> Ministry of Foreign Affairs, G20 Osaka Summit, "G20 Osaka Leader's Declaration." [https://www.mofa.go.jp/policy/economy/g20\\_summit/osaka19/en/documents/final\\_g20\\_osaka\\_leaders\\_declaration.html](https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/en/documents/final_g20_osaka_leaders_declaration.html) (accessed: 2.4.2021)

<sup>71</sup> Ministry of Foreign Affairs, "G20 Development Working Group (DWG) Guiding Principles for the Development of Science, Technology, and Innovation for SDGs Roadmaps." [https://www.mofa.go.jp/policy/economy/g20\\_summit/osaka19/pdf/documents/en/annex\\_12.pdf](https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/pdf/documents/en/annex_12.pdf) (accessed: 2.4.2021)

<sup>72</sup> Miedzinski, M., Kanehira, N., Cervantes, M., Mealy, S., Kotani, R., Bollati E., "Science, Technology and Innovation (STI) for SDGs Roadmaps—Background Paper: International STI collaboration and investment for Sustainable Development Goals," 2020. [https://sustainabledevelopment.un.org/content/documents/269391\\_BP\\_Roadmaps\\_IntlCollaboration\\_final\\_7\\_09\\_20.pdf](https://sustainabledevelopment.un.org/content/documents/269391_BP_Roadmaps_IntlCollaboration_final_7_09_20.pdf) (accessed: 26.3.2021)

<sup>73</sup> Japan International Cooperation Agency (JICA), AUN/SEED-Net. <https://seed-net.org/> (accessed: 26.3.2021)



between academic institutions and industrial sectors in ASEAN and Japan.”<sup>74</sup> During 17 years of the history the program’s history, it has supported more than 1400 academic staff of ASEAN countries to acquire higher degrees providing opportunities to study in the region or at universities in Japan.

#### ■ Science and Technology Research Partnership for Sustainable Development (SATREPS)

SATREPS<sup>75</sup> promotes international joint research with developing countries and is funded through a combination of national STI budget and ODA. It is joint implemented by the Ministry of Foreign Affairs (MOFA), the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Japan International Cooperation Agency (JICA), the Japan Science and Technology Agency (JST), and the Japan Agency for Medical Research and Development (AMED).

SATREPS aims to strengthen S&T cooperation with developing countries and tackle global challenges through win-win cooperative relationships: spurring new technology, new knowledge, and innovations; boosting self-reliant R&D capacity and sustainable research systems; and contributing to society through the application of research outcomes.

SATREPS has implemented 157 projects in 52 countries between 2008 and 2020 in four research areas: (1) environment & energy; (2) bioresource utilization; (3) disaster prevention & mitigation; (4) infectious diseases control.

A one-year pilot gap funding program “Accelerating Social Implementation for SDGs Achievement (aXis)”<sup>76</sup> was implemented on a trial basis by JST in 2020. The program nurtures and accelerates “seeds” contributing to the application of research results from SATREPS and similar programs, ultimately helping to achieve SDGs.



**Figure 11.** Countries where SATREPS projects have been implemented.

Source: JST SATREPS, <https://www.jst.go.jp/global/> (accessed: 7.4.2021)

<sup>74</sup> AUN/SEED-Net, “Annual Report 2019-2020.” <https://seed-net.org/annual-reports/> (accessed: 26.3.2021)

<sup>75</sup> Japan Science and Technology Agency (JST), SATREPS. <https://www.jst.go.jp/global/english/index.html> (accessed: 26.3.2021)

<sup>76</sup> Japan Science and Technology Agency (JST). aXis. <https://www.jst.go.jp/global/axis/en/outline/index.html> (accessed: 22.4.2021)

### Box: Creating rice varieties and cultivation technology tailor-made for Kenya's environment

In Kenya, rice consumption has increased rapidly in recent years. However, hurdles such as droughts and cold damage prevent any increase in rice production. With cutting-edge Japanese technologies such as DNA marker-assisted selection technology, tailor-made stress-resistant genes were introduced, and several promising lines suitable for the local environment were developed. Furthermore, improvements were made to the local fertilization system and water management technology. By making use of the established research base, the project is further developing as a hub for rice research and breeding in the sub-Saharan region.



Source: [https://www.jst.go.jp/global/english/kadai/h2406\\_kenya.html](https://www.jst.go.jp/global/english/kadai/h2406_kenya.html) (accessed: 4.8.2021)

### ■ Strategic International Collaborative Research Program (SICORP)

SICORP<sup>77</sup> is another of JST's international joint research programs contributing to individual needs and global well-being through STI. It uses an equal-partnership matching funds system, collaborating with research funders in likeminded countries/regions that share common challenges. Some of the programs under SICORP directly contribute to achieving the SDGs in collaboration with emerging/developing/developed countries:

- **The East Asia Science and Innovation Area Joint Research Program (e-ASIA JRP)**<sup>78</sup> aims to develop a vibrant and collaborative research community in science and technology, promote innovation and contribute to the economic development of the East Asian region. The program started in 2012 as a joint initiative among public funders of the East Asia Summit (EAS) member countries, and targets regional common challenge such as alternative energy, agriculture, and disaster risk reduction/management.
- **Africa-Japan Collaborative Research (AJ-CORE)**<sup>79</sup> aims to solve challenges affecting Africa and the world. A multilateral research framework connects researchers from three (or more) countries: Japan, South Africa, and at least one other sub-Saharan African country on an equal-partnership basis. The program builds and connects knowledge to increase the impact of research, explores new development paths, enhances human capacity development in STI, and accelerates the transitions to sustainable development through multi-stakeholder (including social scientists, enterprises, NGOs, citizens) commitments to research outcome application.
- **'Science, Technology and Action' Nexus for Development (STAND)**<sup>80</sup> aims to achieve the SDGs through concerted action of multiple funders, synergizing various

<sup>77</sup> Japan Science and Technology Agency (JST). SICORP. [https://www.jst.go.jp/inter/english/program\\_e/structure\\_e/general.html](https://www.jst.go.jp/inter/english/program_e/structure_e/general.html) (accessed: 22.4.2021)

<sup>78</sup> Japan Science and Technology Agency (JST). e-ASIA JRP. <https://www.the-easia.org/jrp/> (accessed: 8.4.2021)

<sup>79</sup> Japan Science and Technology Agency (JST). AJ-CORE. [https://www.jst.go.jp/inter/english/program\\_e/multilateral\\_e/aj-core.html/](https://www.jst.go.jp/inter/english/program_e/multilateral_e/aj-core.html/) (accessed: 22.4.2021)

<sup>80</sup> Japan Science and Technology Agency (JST). STAND. [https://www.jst.go.jp/inter/english/program\\_e/multilateral\\_e/stand.html](https://www.jst.go.jp/inter/english/program_e/multilateral_e/stand.html) (accessed: 8.4.2021)

R&D programs that were previously conducted separately. STAND supports multilateral collaboration among researchers in Japan, developed countries, and emerging/developing countries, for a more collective response to the 2030 Agenda.

#### ■ J-RAPID

J-RAPID<sup>81</sup> is an international emergency program reacting great natural or anthropogenic disasters, conducting prompt collaborative surveys and research that can help preventing or mitigate future disasters. Together with funders from likeminded countries, past J-RAPID research includes the Great East Japan Earthquake of 2011, the Anak Krakatau volcano eruption and tsunami in Indonesia in 2019, the global COVID-19 pandemic in 2020 etc..

#### ■ Collaboration with UNDP Accelerator Labs

From FY2020, the Cabinet Office began supporting the preparation of the STI for SDGs roadmap for Kenya and India through the World Bank, following Japan's becoming a partner country of the UN Global Pilot Program. The Cabinet Office also began to support the Japan SDGs Innovation Challenge for UNDP Accelerator Labs, in which Japanese organizations work on local issues identified by UNDP's Accelerator Labs around the world. This project is managed by the SDGs Holistic Innovation Platform (SHIP)<sup>82</sup> which is jointly run by the Japan Innovation Network (JIN) and the United Nations Development Programme (UNDP). In FY2020, projects in India, Turkey, Vietnam, and the Philippines were supported.

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<sup>81</sup> Japan Science and Technology Agency (JST). J-RAPID. [https://www.jst.go.jp/inter/english/program\\_e/j-rapid\\_e/j-rapid.html](https://www.jst.go.jp/inter/english/program_e/j-rapid_e/j-rapid.html) (accessed: 8.4.2021)

<sup>82</sup> SDGs Holistic Innovation Platform (SHIP). <https://www.sdgs-ship.com/en/> (accessed: 8.4.2021)

## Key events since the 2015 UN Resolution on the SDGs, in the world and in Japan

Year	Key World events (in general)	Key World events (regarding the SDGs and/or STI)	Key events in Japan (in general)	Key events in Japan (regarding the SDGs and/or STI)
2015	<p>Terrorist attacks by Islamic extremists around the world</p> <p>Refugee crisis in Europe</p> <p>Aug.: Worldwide fall in share prices originating from a massive fall in Chinese stocks starting in June</p> <p>Dec.: Inauguration of Asian Infrastructure Investment Bank (AIIB)</p>	<p>Jun.: The UN "GSDR 2015" published</p> <p>Sep.: The UN "2030 Agenda" (SDGs resolution) unanimously adopted</p> <p>Dec.: The "Paris Agreement" on climate change adopted at COP21</p> <p>Dec.: Establishment of the Task Force on Climate-related Financial Disclosures (TCFD)</p>	<p>Apr.: The Nikkei Stock Average recovered to 20,000 yen for the first time in 15 years</p> <p>Sep.: Legislation for Peace and Security enacted</p> <p>Oct.: The Social Security and Tax Number System started</p> <p>Oct.: Broad agreement reached for the Trans-Pacific Partnership (TPP)</p>	<p>Apr.: The National Research and Development Agency System started</p> <p>Apr.: Establishment of the Japan Agency for Medical Research and Development (AMED)</p> <p>Sep.: Japan's first Science and Technology Advisor to the Minister for Foreign Affairs appointed</p>
2016	<p>Apr.: The EU's General Data Protection Regulation (GDPR) enacted</p> <p>Jun.: UK votes to leave EU in "Brexit" referendum</p> <p>Aug.-Sep.: Summer Olympic &amp; Paralympic Games in Rio de Janeiro</p>	<p>The UK's Global Challenge Research Fund (GCRF) initiated</p> <p>Jan.: "Fourth Industrial Revolution" proposed in the World Economic Forum in Davos</p> <p>May: First UN STI Forum held (annually thereafter)</p> <p>Jul.: The UN SDGs Report published (annually thereafter)</p> <p>Sep.: Second INSGA Conference held in Brussels</p> <p>Nov.: The Paris Agreement put into effect</p>	<p>Jan.: Introduction of a negative interest rate decided by the Bank of Japan</p> <p>Apr.: Kumamoto Earthquake</p> <p>May: G7 Ise-Shima Summit</p> <p>Damage caused by the frequent occurrence of heavy rain</p> <p>Aug.: Sixth Tokyo International Conference on African Development (TICAD6) held (Kenya)</p> <p>Dec.: Japan-Russia summit meeting, commencement of negotiations on joint economic activities in the Northern Territories</p>	<p>Jan.: Fifth Science and Technology Basic Plan decided (Society 5.0 proposed)</p> <p>Feb.: First meeting of the Advisory Board for Promoting Science and Technology Diplomacy held</p> <p>Apr.: Establishment of the Artificial Intelligence Technology Strategy Council</p> <p>May: Establishment of the "Sustainable Development Goals (SDGs) Promotion Headquarters" in the Cabinet</p> <p>Dec.: SDGs Implementation Guiding Principles decided</p>
2017	<p>Jan.: Inauguration of US President Trump</p> <p>May: Inauguration of French President Macron at the youngest age (39 years old) in French history</p> <p>Dec.: China bans import of waste plastics</p>	<p>Jan.: The market opportunities by the SDGs estimated to be \$12 trillion at the World Economic Forum in Davos</p> <p>Jun.: The US's withdrawal from the Paris Agreement announced</p> <p>Sep.: Canada's first Chief Science Advisor appointed</p>	<p>Jul.: The Government Pension Investment Fund (GPIF) started "ESG investment"</p> <p>Jul.: Outline agreement reached on the "Japan-EU Economic Partnership Agreement (EPA)"</p>	<p>May: Advisory Board for Promoting Science and Technology Diplomacy: "Recommendation for the future"</p> <p>Jul.: The government presented its Voluntary National Review (VNR) in the UN HLPF</p> <p>Nov.: Keidanren's "Charter of Corporate Behavior" revised</p> <p>Dec.: First Japan SDGs Award (held annually thereafter)</p> <p>Dec.: SDGs Action Plan 2018 (decided annually thereafter)</p>
2018	<p>Escalation of the trade friction between the US and China, the competition for technological leadership, and security issues</p> <p>Jun.: G7 "trade issues," confrontation between the US and its allies</p> <p>Jun.: US-North Korea summit meeting held for the first time</p> <p>Sep.: The market capitalization of Apple in the US exceeded \$1 trillion; the rise of GAFA</p> <p>Nov.: The Dow surpassed \$24,000 for the first time in history</p>	<p>Jun.: The G7 "Ocean Plastics Charter" not signed by Japan and the US</p> <p>Jul.: Inauguration of the International Science Council (ISC) (the merger of the ICSU and the ISSC)</p> <p>Jul.: IASA "TWI2050 Report" published ("The Six Transformations")</p> <p>Nov.: Third INSGA Conference held in Tokyo</p>	<p>Jan.: Fraudulent outflow of virtual currencies worth 58 billion yen</p> <p>Jun.: Work-style reform legislation enacted</p> <p>Nov.: Decision to place a bid to host the 2025 World Expo in Osaka, Kansai</p> <p>Dec.: New agreement "TPP11" put into effect by the TPP signatory countries excluding the US</p>	<p>Jan.: Establishment of the STI for SDGs Task Force of the Cabinet Office</p> <p>Apr.: Fifth Basic Environment Plan decided</p> <p>May: UN Expert Group Meeting on STI for SDGs in Tokyo</p> <p>May: Advisory Board for Promoting Science and Technology Diplomacy: "Recommendation on STI for SDGs and Roadmaps"</p> <p>Jul.: Fifth Basic Energy Plan decided</p> <p>Jul.: Establishment of the "Integrated Innovation Strategy Promotion Council" in the Cabinet</p> <p>Aug.: Establishment of the Public-Private Partnership Platform for Regional Revitalization SDGs</p> <p>Nov.: Third INSGA International Conference held in Tokyo</p>
2019	<p>Jan.: CFO of "Huawei Technologies" of China indicted by the US Department of Justice</p> <p>Feb.: Second US-North Korea summit meeting</p> <p>Jun.: Major protests in Hong Kong against the extradition law amendment bill</p> <p>Jul.: Appointment of Prime Minister Johnson of the UK, a hard Brexiter</p>	<p>Jan.: A Chinese space probe landed on the far side of the moon for the first time in history</p> <p>Sep.: The UN "GSDR 2019" published, and the first "SDG Summit" held</p> <p>Sep.: Greta Thunberg delivered a speech at the UN Climate Action Summit</p> <p>Dec.: European Commission's "European Green Deal" announced</p>	<p>May: Change of the era designation (from Heisei to Reiwa)</p> <p>Jun.: G20 Osaka Summit held (STI for SDGs roadmaps, data, and AI)</p> <p>Aug.: Seventh Tokyo International Conference on African Development (TICAD 7) held in Yokohama</p> <p>Oct.: Consumption tax increased to 10%, and a reduced tax rate system introduced</p>	<p>Mar.: Advisory Board for Promoting Science and Technology Diplomacy: "Recommendations towards TICAD7"</p> <p>Mar.: "Social Principles of Human-Centric AI" decided</p> <p>Apr.: METI's "The Guide for SDG Business Management" published</p> <p>Sep.: Prime Minister Abe presented Japan's initiatives at the "UN SDG Summit"</p> <p>Dec.: SDGs Implementation Guiding Principles revised</p>
2020	<p>The spread of COVID-19 all over the world</p> <p>Jan.: The UK's official withdrawal from the EU</p> <p>Nov.: The Dow surpassed \$30,000 for the first time in history</p> <p>Dec.: The world's first vaccination against COVID-19 launched in the UK</p>	<p>May: Fifth UN STI Forum canceled (postponed to 2021)</p> <p>Sep.: "Guidebook for the Preparation of STI for SDGs Roadmaps" published</p> <p>Nov.: The US's withdrawal from the "Paris Agreement"</p>	<p>Jan.: Confirmation of the first COVID-19 case in Japan</p> <p>Mar.: Tokyo Olympic &amp; Paralympic Games postponed by one year</p> <p>Apr.: Declaration of a state of emergency made as a measure against COVID-19 (until May)</p> <p>Apr.: Establishment of an economic section in the National Security Secretariat of the Cabinet Secretariat</p> <p>Sep.: Inauguration of the Suga Cabinet</p>	<p>STI for SDGs Award of the Japan Science and Technology Agency (JST) initiated</p> <p>Mar.: 5G services started by three mobile carriers</p> <p>Jun.: Amended "Basic Act on Science, Technology, and Innovation" enacted</p> <p>Jul.: Paying for plastic shopping bags made mandatory</p> <p>Oct.: Declaration of "achieving carbon neutrality by 2050" by Prime Minister Suga</p>
2021	<p>Jan.: Inauguration of US President Biden</p>	<p>The EU's Horizon Europe launched (~2027)</p> <p>Feb.: The US returned to the "Paris Agreement"</p> <p>Feb.: The OECD's "The design and implementation of mission-oriented innovation policies" published</p>	<p>Feb.: The Nikkei Stock Average recovered to 30,000 yen for the first time in 30 years</p> <p>Feb.: Vaccination against COVID-19 started (for healthcare practitioners)</p>	<p>Feb.: "Moonshot Research and Development Program" fully launched</p> <p>Mar.: Cabinet decision on the "Sixth Science, Technology, and Innovation Basic Plan"</p>

## Appendix

# JST's Activities in STI for SDGs

The Japan Science and Technology Agency (JST)<sup>83</sup> is an advanced network-based research institute promoting state-of-the-art R&D projects to co-create innovation for tomorrow's world together with society. Based on the Science and Technology Basic Plan (STI Basic Plan) adopted by the government, JST implements various R&D programs and formulates strategies for co-creating the future with society. Such missions of the JST as “maximizing R&D achievements” and “co-creating the future with society by resolving issues” are highly compatible with the SDGs which aim to “transform society and realize a sustainable society.” Moreover, the business opportunities provided by striving for the SDGs contribute to the creation of new economic and social value through STI as promoted by JST.

Under the initiative of President HAMAGUCHI Michinari, JST has announced the HAMAGUCHI Plan<sup>84</sup> to “prioritize research which has clear social value and aligns with international consensus i.e. SDGs” and to “promote co-creative research that contributes to the SDGs.” JST's cross-cutting activities in this regard are as follows.

## A.1 Task team and the Office of STI for SDGs

In October 2016, JST established a task team for achieving the SDGs through STI, and began research and analysis related to the SDGs, networking with SDG-related organizations and stakeholders, and holding symposia and conferences. The team published a report on 40 case studies of SDGs practices in Japan,<sup>85</sup> which was introduced at the second UN STI Forum held in May 2017.

In April 2018, the Office of STI for SDGs was established in the Corporate Planning Department of JST to promote STI for SDGs. In October 2018, JST established its Basic Policies on STI for SDGs<sup>86</sup> setting the following three pillars for its action plans.

1. Promoting public awareness and advocating the importance of STI for SDGs (SDGs for all, STI for all)
2. Implementing programs contributing to the achievement of the SDGs (STI for SDGs)
3. Operating programs from STI for SDGs perspectives (SDGs for STI)

<sup>83</sup> Japan Science and Technology Agency (JST), “About JST.” <https://www.jst.go.jp/EN/about/strategy.html> (accessed: 9.4.2021)

<sup>84</sup> JST, “The HAMAGUCHI Plan,” 2019. <https://www.jst.go.jp/EN/about/strategy.html> (accessed: 9.4.2021)

<sup>85</sup> JST, “Book of Japan's Practices for SDGs,” 2018. [https://www.jst.go.jp/sdgs/pdf/sdgs\\_book\\_en\\_2018\\_2.pdf](https://www.jst.go.jp/sdgs/pdf/sdgs_book_en_2018_2.pdf) (accessed: 9.4.2021)

<sup>86</sup> JST, “(Edited Version) Basic Policies on the Contribution of Science, Technology and Innovation for the Achievement of the Sustainable Development Goals (STI for SDGs) at Japan Science and Technology Agency (JST).” [https://www.jst.go.jp/sdgs/en/pdf/jst\\_approach\\_ver2.pdf](https://www.jst.go.jp/sdgs/en/pdf/jst_approach_ver2.pdf) (accessed: 9.4.2021)



## A.2 Promoting public awareness and advocating the importance of STI for SDGs: SDGs for all, STI for all

JST strives to keep up with national and international trends related to the SDGs and promotes awareness and recognition by sharing the latest information in Japan, particularly initiatives to leverage STI for achieving the SDGs (STI for SDGs). Below are some examples of JST initiatives and programs.

- Local STI for SDGs<sup>87</sup>: JST launched a subcommittee in February 2019 for promoting collaborative initiatives among stakeholders to resolve local issues related to the SDGs with STI based solutions toward holistic and sustainable regional revitalization. The subcommittee “STI Localization for the SDGs,” aims to enhance partnerships among local governments, the private sector, including small and medium enterprises, local citizens groups, universities and national research institutes. As of Jan. 2021, the subcommittee comprises 29 organizations.
- Exhibits at open forums: This include the JST Fair, Science Agora (one of Japan's largest open forums for connecting science and society), American Association for the Advancement of Science (AAAS) annual meeting, and more.
- STI for SDGs Awards: The STI for SDGs Award program was launched in 2019 to recognize excellent initiatives that have achieved results in solving social issues through STI. The awards aim to raise public interest in these initiatives, promote their further development and deployment to other regions, and thereby contribute to the achievement of the SDGs.

## A.3 Implementation of programs contributing to the achievement of the SDGs: STI for SDGs

JST aims to contribute to the achievement of the SDGs through programs for creating an environment in which diverse stakeholders can engage in dialogues, co-design and work together, resolve issues and pursue society's goals. Examples of specific initiatives and programs include the following.

- Programs for promotion of science in society: To create research and development (R&D) outcomes with social impact, JST is committed to promote co-creation activities including dialogue and interaction involving multiple stakeholders from various sectors of society, and the dissemination to the public information related to STI and the societal challenges that need to be addressed.
- Solution-Driven Co-creative R&D Program for SDGs: JST initiated a program named “Solution-Driven Co-creative R&D Program for SDGs (SOLVE for SDGs)”<sup>88</sup> that aims to use STI to resolve social issues in specific local regions in Japan, compile the outcomes into project plans, and implement these as applicable social systems in other regions in Japan

<sup>87</sup> JST, “Local STI for SDGs.” <https://www.jst.go.jp/EN/about/strategy.html> (accessed: 9.4.2021)

<sup>88</sup> JST, Research Institute of Science and Technology for Society (RISTEX), Solution-Driven Co-creative R&D Program for SDGs. <https://www.jst.go.jp/ristex/en/index.html> (accessed: 9.4.2021)

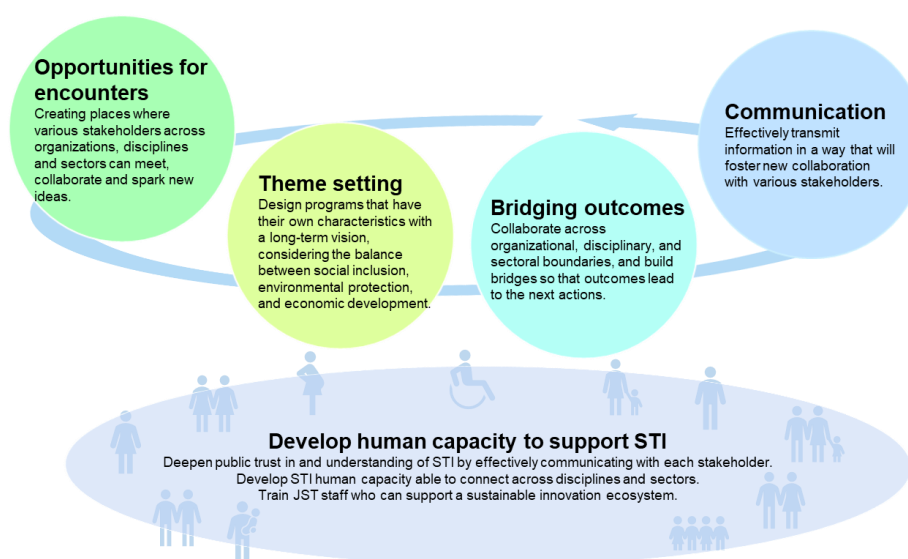
and overseas.

- COI-NEXT Program: Through industry-academia co-creation centering on universities but also involving various stakeholders such as corporations, local governments, and citizens, this program formulates a “vision” for an ideal future society based on the SDGs. The program supports back cast-type research and development for the realization of the vision through construction of an industry-academia co-creation system capable of sustainable operation.
- Various programs for international collaboration including SATREPS, e-ASIA JRP and J-RAPID, as described in Chapter 3.

#### A.4 Operating programs from STI for SDGs perspectives: SDGs for STI

To maximize and disseminate the results of programs that could contribute to achieving the SDGs, JST prioritizes the formation of innovation ecosystems through the synergetic implementation of relevant programs oriented to societal problems. It also gathers stakeholders routinely to stimulate discussions on how to strengthen the promotion of STI for SDGs in JST's initiatives.

JST funds diverse ongoing programs as well as new SDG-centric programs. Though it does not intend to build a new system from scratch, a shift in management policy is required to harmonize with the age of SDGs. After intense consultation among JST staff, five aspects have been identified to further promote STI for SDGs; creating opportunities for encounters; theme setting; bridging outcomes; communication; human capacity development to support STI (**Figure 12**). The overarching challenge is to nurture the STI ecosystem by leveraging JST's wide network acquired through its activities such as visionary R&D strategy planning, science communication, fostering of human capacity in STI, and developing STI information platforms. The comprehensive nature of JST's activities brings the strength and responsibility to lead new value creation through STI.



**Figure 12.** Five aspects to further promote STI for SDGs. Source: JST.

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## **Mobilizing Science, Technology and Innovation for SDGs: Japanese Actions in STI for SDGs**

April 2021, Japan Science and Technology Agency

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