Recommendation on

Science, Technology and Innovation to Achieve the SDGs

and its Guiding Tool, the STI Roadmap

- To Think, Proceed and Create Together with the World -

28 May 2018

Advisory Board for the Promotion of Science and

Technology Diplomacy

1 Objective and background of the recommendation

(1) The position of STI in the pursuit of achieving the SDGs

(a) The "Sustainable Development Goals (SDGs)" adopted by the United Nations in 2015 are a master plan that seeks to realize a sustainable society by 2030, putting an end to all forms of poverty, fighting inequality, and coping with climate change under the slogan, "no one left behind." The SDGs are a common language that guides both developing and advanced nations. Addressing the SDGs is also an important effort to overcome the three challenges facing the international community today: the challenge for achieving global sustainability, the challenge the risk of disparity poses to the global market economy, and the challenge facing democracy. Diverse, multilayered science, technology and innovation (STI) can contribute to the realization of the SDGs as a deciding factor for making the best use of the limited resources. It can therefore be considered an essential, cross-cutting element. These expectations towards science also derive from the spirit of Budapest Declaration of 1999, which emphasized the concept of science for development and science for society.

(b) In May 2017, the Advisory Board for the Promotion of Science and Technology Diplomacy announced the "Recommendation for the Future: STI as a Bridging Force to Provide Solutions for Global Issues." The recommendation proposed four initiatives as actions of science and technology diplomacy to support the realization of the SDGs: (i) share a vision of a future created by "Change through Innovation;" (ii) "Grasp and Solve" issues through utilization of Earth-scale data; (iii) "Link Across Sectors, Unite Across the Globe;" in order to carry this out; and (iv) "Foster Human Resources for 'STI for SDGs'" to support these initiatives.

(2) Systematically advancing STI for SDGs: The expectations for a roadmap

(a) We are now at the stage where the international community needs to realize these actions. How should various stakeholders coming from different positions promote progress systematically? At the UN STI Forums held in June 2016 and May 2017, as well as at workshops held in Incheon in December 2017 and Tokyo in May 2018, many stakeholders from the international community have pointed out the need to draft the roadmap on utilizing STI to achieve the SDGs, and the need to "deep dive" into each of the individual goals.

In light of these discussions, at the Third UN STI Forum in June this year, there are expectations for discussions among countries aiming for a framework to promote concrete actions towards the formulation of the STI roadmap. This would then contribute to the successful conclusion of the upcoming Osaka G20, TICAD7 and 2019 Summit-level Meeting.

(b) Based on the current circumstances, the Advisory Board for the Promotion of Science and Technology Diplomacy has deliberated on how a diverse group of stakeholders can promote the effort to develop the STI roadmap responding to their individual circumstances, and then worked out this recommendation. The recommendation incorporates the inputs from Advisory Board members, as well as external experts and related organizations.

2   International trends surrounding STI, and the SDGs

(1) The role of the SDGs in guiding the development of STI

(a) In the UN STI Forum, as part of the implementation mechanism for SDGs, diverse stakeholders representing the entire international community, such as members of the government, academia, industry, civil society, domestic and international funding and development organizations, public utility organizations and NGOs directly discuss STI, including its political and social aspects, which makes the forum unique.

(b) Besides the role of STI in resolving the wide-ranging social issues addressed by the SDGs, there is growing emphasis on the role of SDGs in setting the course of future development for STI itself. A diverse group of stakeholders working towards the realization of the SDGs from their respective standpoints in the form of a Public Private Partnership (PPP) will go beyond only solving social problems, to also foster opportunities for the creation of new investment and businesses through enhanced cooperation of universities and corporations, thus leading to the opening of new frontiers in science and technology. This virtuous circle will also serve as motivation to move from the stage of discussion to concrete action.

(2) STI for SDGs: Engaging as a unified "plane" and promoting STI awareness

(a) We occasionally witness cases stakeholders attempt to utilize STI for SDGs with insufficient coordination. In other words, we are currently at the stage of unconnected "dots" and "lines." If these stakeholders can organically cooperate with each other to tackle a problem as a unified "plane", then such actions can have a greater effect, thus leading to creation of new value. Additionally, by undertaking an endeavor together as a unified "plane", the position of each stakeholder can become clear, and the goal they should strive for and direction of their activities is also clarified.

(b) "STI for SDGs" is not yet a concept familiar to everyone. To extend its reach to a wide range of people, and advance the contributions made through science and technology as intellectual property both domestically and abroad, it is critical that we gain the broad understanding of citizens, and that each individual understands it as a challenge that faces them personally. For that, capacity building and education are essential.

(a) As stated in our "Recommendation for the Future" in May 2017, we need to grasp the local needs (challenges) including those regarding technology, human resources and investment, analyze the gap between the ideal and the real state, conduct research and development based on consideration of those needs, and scale up and bring the results of research and developed systems to the stage of practical implementation, thereby promoting social changes. The key lies in how we can create this circular flow of "STI for SDGs."

(b) The roadmap and online platform are effective methods to bring this cycle to life. The platform will serve as one method to assist the formation of the aforementioned circular flow, and is one of the key necessary methods to achieve the SDGs. While education and capacity building are also important elements concerning "STI for SDGs," in this recommendation we would like to hereafter take up the STI roadmap (a sample roadmap is attached for reference) in detail.

3   Points to consider when formulating the STI roadmap: Creating layers and structures

(1) The STI roadmap: A tool for communication

(a) Some countries and organizations have thus far utilized STI to achieve the SDGs and achieved results to some extent. To realize further progress in these efforts towards the achievement of the far-reaching SDGs, however, we must formulate a process of a more systematic mutual collaboration and cooperation, in which each country and organization exchanges the necessary know-how with each other. This can be made possible when each country carefully considers how they can integrate the "STI for SDGs" into their national strategy and policy, and formulate the appropriate STI roadmap according to their own will. It can also help to utilize the rapidly developing STI in society in a human-centered and inclusive approach without disparity, amidst concerns about the possible downside of new technologies and technological innovation, such as loss of employment and exacerbation of disparity.

(b) In leveraging STI in a systematic way to realize a sustainable society, we must refine and analyze the possible paths to achieve the SDGs from diverse perspectives, putting into order various elements including the following: synergies and trade-offs between SDG goals, national policies and plans that relate to each goal, the trend of science and technology, formulation and joint development of major initiatives, bottlenecks in achieving the goals as well as research and development, and system design and investment necessary to overcome such bottlenecks. Through research and analysis and such "knowledge structuring", we can have a bird's eye view of the actions which should be

taken by each stakeholder. We should then bring together the contributions made thus far by all stakeholders towards the achievement of the SDGs, and monitor those initiatives to ensure this process works well. Within this procedure, we can use the STI roadmap as a shared communication tool to visualize what and by when we must do.

(2) Three points to note when formulating the STI roadmap

We would like to propose the following three points for each nation to consider when formulating their STI roadmap.

(a) Point one - how we pursue "knowledge structuring".

While each country has its unique circumstances and methods available to achieve the SDGs, the views and responses to the problems and challenges also will change depending on how you understand and frame them. To that end, "knowledge structuring" will bind the various goals together, and thus help to maximize the synergistic effect that can be achieved between the various goals on the roadmap, and to minimize the negative effects of trade-offs.

(b) Point two - how we formulate the STI roadmap to achieve the SDGs.

One practical answer to this question is to form a "three-layer approach."

The first layer is primarily focused on the policy side. The roadmap assists policy makers as they carefully consider the policy visions from a large and long-term scale, and promote the national mechanisms to monitor the state of STI utilization.

The second layer is the more practical roadmap for the strategic implementation of each of the 17 goals. When formulating the roadmap, it is essential that stakeholders look beyond the science and technology aspects, and include legal, social and economic perspectives as well.

The third layer is the practical roadmap that addresses individual projects and promotes the accumulation and sharing of knowledge and experience built up by the various stakeholders.

(c) Point three - how we manage the process.

An effective way to achieve appropriate management is to implement practical policies based on the roadmap first, and share the lessons learned and good practices on the online platform. Referring to them, we need to manage the set of processes in an appropriate manner, in which we adjust the current roadmap as necessary, and implement adjusted policies while sharing the adjustments on the platform.

4　Extracting "Common Elements" from the STI roadmap

(1) The advantages of sharing common elements and processes of the STI roadmap

(a) The goals that should be set within the STI roadmap differ based on the stage of development and social, economic and political situations of each country, leading to differences in the form of each STI roadmap. There is therefore no single type of STI roadmap that can be uniformly applied to all countries. There should be, however, essential elements common to the STI roadmap formulation of all countries, even as they face different circumstances.

(b) At the moment, only a few countries have already formulated the STI roadmap. The sharing of their knowledge on the formulation process (communization) will serve as a vital reference for countries that are considering the formulation of the STI roadmap, and for other countries that face similar challenges.

(c) Furthermore, as one method to assist the formulation of the STI roadmap, in addition to the annual "Sustainable Development Goals Report" released by the UN Secretary-General to portray the entire picture using benchmarks on the progress towards achieving the SDGs, it would be highly beneficial to share and utilize the knowledge and experience of international organizations, which have thus far provided advice to many countries based on a variety of reviews and surveys, among organizations and countries in an appropriate manner.

(2) Points to note when developing the STI roadmap internationally

(a) It is necessary to remind ourselves that while the various stakeholders have "common" shared concerns, they each have their own "different" characteristics. Even when referring to the roadmaps of other parties, each country must not forget to adapt the STI roadmap to their own social, economic and cultural circumstances (customization).

(b) In the international advancement of the STI roadmap, eyes are now on whether we can understand the challenges and needs facing each country, how we can match resolutions (technology seeds) to those needs, and how well that mechanism can be established into a process.

5　The next step, and Japan's role to fulfill

(1) Formulating the STI roadmap with an eye to the Osaka G20 and TICAD7, and Japan's role to fulfill

(a) In the next step, it is desirable that each stakeholder present their "STI for SDGs" related initiatives to the international community, leverage the knowledge of international organizations as necessary, advance discussions towards the extraction of the

aforementioned "common elements", and promote their initiatives towards the formulation of the STI roadmap, including in the context of various meetings such as the Osaka G20, TICAD7 and 2019 SDGs Summit-level Meeting.

(b) In this context, Japan, which launched its "STI for SDGs" roadmap initiatives at an early stage, can play a significant role.

(i) In December 2017, Prime Minister Abe provided instructions regarding the formation of the international roadmap for STI to contribute to the SDGs at the SDGs Promotion Headquarters, which advance initiatives towards achieving the SDGs. In response, Japan is analyzing and refining the STI related policies and plans targeting the 17 SDGs, aiming to create Japan's own roadmap.

(ii) Japan has also advanced various "STI for SDGs" related initiatives outside of the public sector. For example, Keidanren revised the Charter of Corporate Behavior. It supports advancement of the SDGs, as well as "Society 5.0," which seeks to realize a human centered society that addresses economic development and social issues through a system that harmonizes cyberspace (virtual space) together with physical space in a sophisticated manner. Contributions to "STI for SDG"s have also been made by private companies as well as by academia, such as universities and national research and development agencies. The initiatives of these stakeholders have been presented in the "Book of Best Practices." Our challenge will be how we can expand these initiatives, and develop the collaboration among the various stakeholders.

(iii) In relation to STI, Japan is promoting "STI for SDGs" while presenting "Society 5.0" as a vision of future society. Furthermore, in regards to matching technology seeds to the needs that arise in the international development of the STI roadmap, Japan possesses world-leading technologies in a variety of fields that can serve as technology seeds. SATREPS, an international cooperation program of Japan that contributes to "STI for SDGs," has a potential to achieve even greater contribution to the SDGs by leveraging Japan's technological assets through practical implementations in society.

(c) It is important that a broad base of people can enjoy the benefits of new and emerging technology in utilizing STI for social issues. Japan can share the same perspective with everyone, think together, proceed forward together, and create together holding hands with the world, showing its struggles that have been faced thus far. By doing so, Japan can further meet the expectations of countries that are now endeavoring to produce their own STI roadmap. We hope these efforts will help foster cooperation across the entire international community towards the achievement of the SDGs utilizing STI.
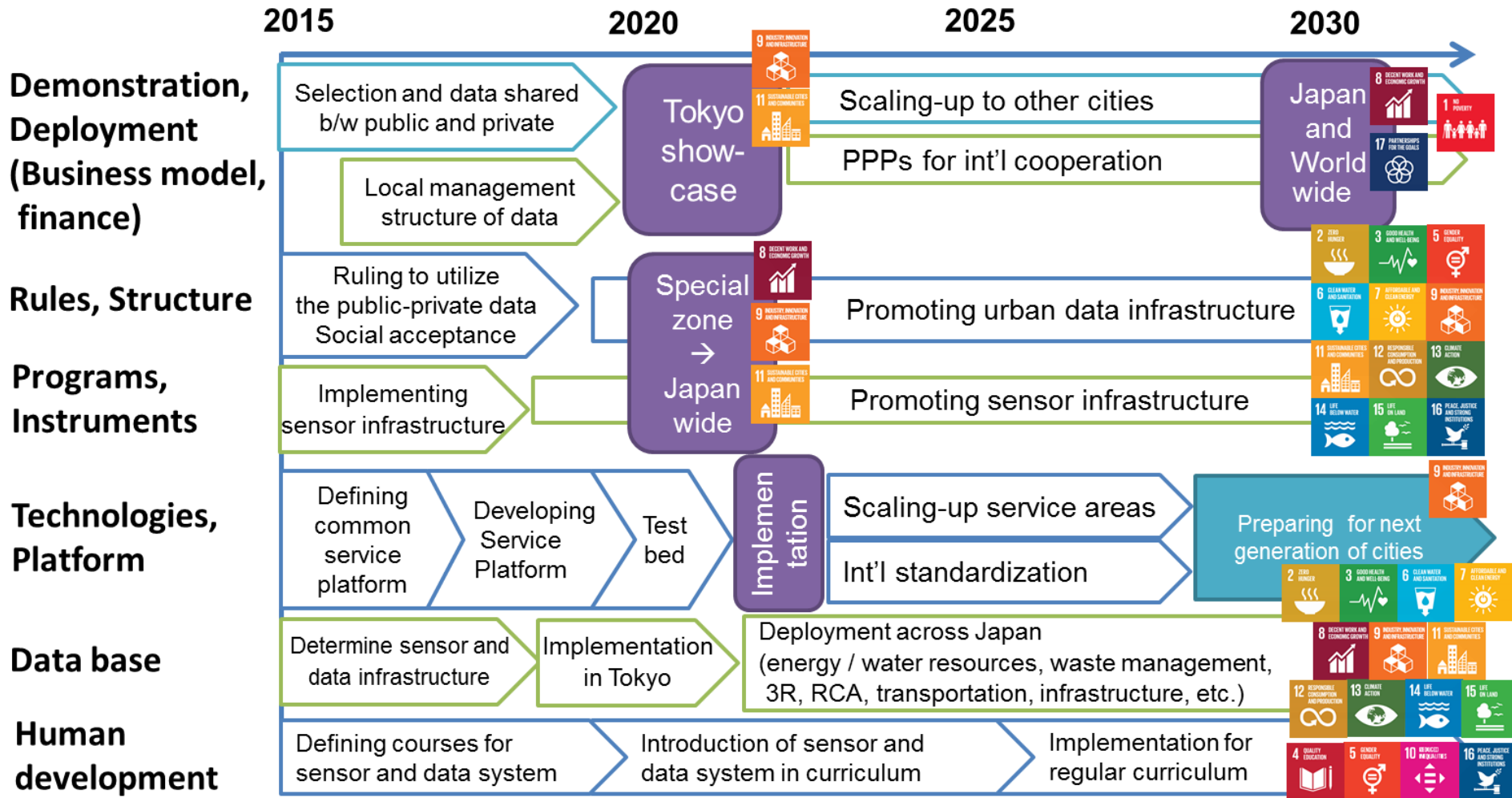
(2) Conclusion

(a) STI is a deciding factor for making the best use of the limited resources in the pursuit of achieving the SDGs. Additionally, multiple stakeholders working together as a unified

"plane" to advance STI can serve as the economic growth engine and lead to new investment and business opportunities, together with the opening of new frontiers in science and technology.

(b) The STI roadmap serves as an effective method to facilitate a virtuous circular flow, that includes "knowledge structuring," by identifying the local needs while putting into order national policies and current trends in science and technology, the various influences STI can have on society, and the trade-offs among SDG goals from diverse perspectives, research and development, and the implementation of those results in society. An STI roadmap tailored to each country's unique circumstances (customization) serves to confirm the current situation and visualize the path forward. Sharing these roadmaps (commonization) provides a vital communication tool among multiple stakeholders.

(c) Japan, which has taken early steps in this field, should share a common perspective with everyone, and by thinking, proceeding and creating together, should provide leadership in the formulation of the STI roadmaps. This can serve as a contribution to the international community, including in the context of the Osaka G20 and TICAD7.

(End)

Digitized and optimized activities in urban cities by Public and Private Partnership

2015   **2020**   **2025**   **2030**

Demonstration, Deployment (Business model, finance)

- Selection and data shared b/w public and private
- Local management structure of data
- Tokyo show-case
- Scaling-up to other cities
- PPPs for int'l cooperation
- Japan and World wide

Rules, Structure

- Ruling to utilize the public-private data Social acceptance
- Special zone → Japan wide
- Promoting urban data infrastructure

Programs, Instruments

- Implementing sensor infrastructure
- Promoting sensor infrastructure

Technologies, Platform

- Defining common service platform
- Developing Service Platform
- Test bed
- Implementation
- Scaling-up service areas
- Int'l standardization
- Preparing for next generation of cities

Data base

- Determine sensor and data infrastructure
- Implementation in Tokyo
- Deployment across Japan (energy / water resources, waste management, 3R, RCA, transportation, infrastructure, etc.)

Human development

- Defining courses for sensor and data system
- Introduction of sensor and data system in curriculum
- Implementation for regular curriculum

* Prepared by JST based on various references

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(Reference)

The 7th meeting of the Advisory Board for the Promotion of Science and Technology Diplomacy and the study group ware held to review the draft recommendation, with the attendance of Mr. Mitsunari Okamoto, Parliamentary Vice-Minister for Foreign Affairs and Ambassador Tomoyuki Yoshida, Director-General, Disarmament, Non-Proliferation and Science Department from Ministry of Foreign Affairs of Japan. The participating government ministries and other relevant organizations are listed below.

Cabinet Secretariat, Office of Healthcare Policy
Cabinet Office
Ministry of Education, Culture, Sports, Science and Technology (MEXT)
Ministry of Economy, Trade and Industry (METI)
Japan Agency for Medical Research and Development (AMED)
Japan International Cooperation Agency (JICA)
Japan Foundation (JF)
Japan Science and Technology Agency (JST)
National Institute of Advanced Industrial Science and Technology (AIST)
New Energy and Industrial Technology Development Organization (NEDO)

Satoru Ohtake	Adjunct Fellow, Center for Research and Development Strategy, Japan Science and Technology Agency (JST)
Taikan Oki	Senior Vice-Rector, United Nations University United Nations Assistant Secretary-General
Mitsunobu KANO	Professor, Graduate School of Interdisciplinary Science and Engineering in Health Systems
Takao Kuramochi	Senior Deputy Director-General, Center for Research and Development Strategy, Japan Science and Technology Agency (JST)