S&T Policy and Automated Driving Promoting Research and Development

Cross-Ministerial Strategic Innovation Promotion Program
Innovation of Automated Driving for Universal Services

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Shin Morishita
Counsellor for Common Service Platform, Bureau of Science, Technology and Innovation
Cabinet Office

<Translated Version>

Key Points of the “Fifth Science and Technology Basic Plan”*

*Cabinet decision of January 22, 2016

- Presents new proposals for initiatives (“Society 5.0,” etc.) oriented toward future transformation of the industrial structure and society based on recognition that an era of great change is arriving.
- Consolidates fundamental strengths in basic research and other areas (by, for example, fostering young human resources, reforming the functions of universities, etc.) to flexibly and appropriately respond to the various changes that may occur in the years ahead.
- Seeks the full-scale development of industry-academia-government collaboration to generate innovation, and builds a system based on a virtuous cycle of human resources, knowledge, and funds.
- Sets performance indicators and numerical targets* to assess policy progress and outcomes on a nationwide basis.

  *It must be remembered that these indicators and targets are intended to ascertain achievement at the national level, and are not to be seen as goals in themselves at the local level.

- States clearly a target for government R&D investment (1% of GDP, total of 26 trillion yen)

Improvement of productivity, generation of national economic growth and employment, maintenance of safety and security for Japan and her citizens, and contribution to affluent living and global development through S&T innovation

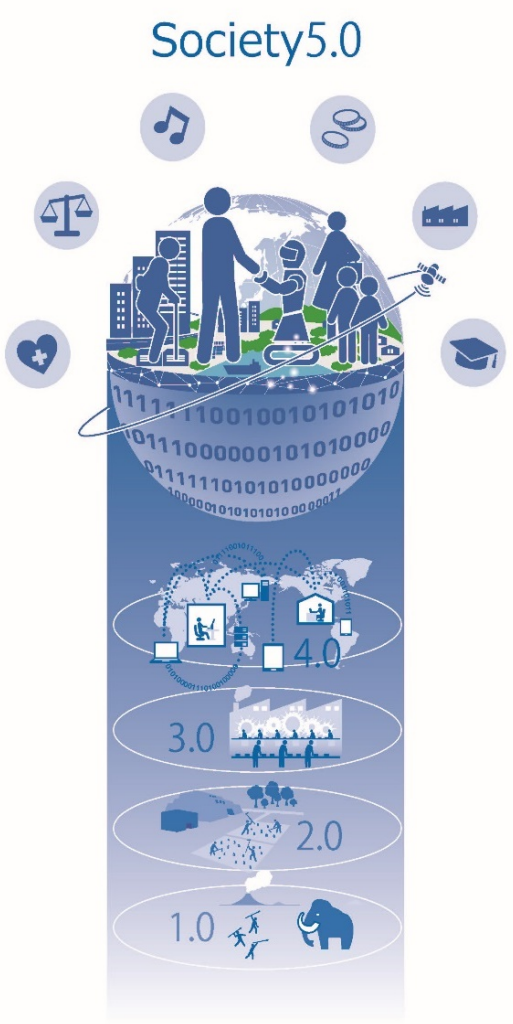
What is “Society 5.0”?

Following on from hunting-and-gathering society, agrarian society, industrial society, and information-oriented society, “Society 5.0” refers to a new social mode of production in which:

(1) By realizing the advanced fusion of cyberspace and physical space,

(2) And by providing goods and services that granularly address manifold latent needs regardless of locale, age, sex, language, or any other consideration, to balance economic advancement with the resolution of social problems,

(3) To bring about a human-centered society in which people can lead high-quality lives full of comfort and vitality



“Comprehensive Strategy on Science, Technology and Innovation 2016”* (Excerpt) 1/3

・Platforms for Realizing “Society 5.0” (The Super Smart Society) as a New Social Mode of Production

*Cabinet decision of May 24, 2016

1) Increase Systems Sophistication and Promote Collaboration and Coordination between Systems

- Of the 11 systems set out in the Comprehensive Strategy for 2015, **Intelligent Transport Systems (ITS)**, Optimized Energy Value Chains, and New Manufacturing (monozukuri) Systems are to be developed as core systems, with a view to collaboration and coordination with other systems and the creation of new value

2) Construction of Databases as a Foundation for the Creation of New Values and Service

- The development of five databases available for use in a variety of fields such as transportation, energy, and infrastructure management dealing respectively with three dimensional (3D) mapping information; visual information; global environmental information; population, commodities, and vehicular information; and information to facilitate the circulation of data between different industries

3) Reinforcing Basic Technologies that Underlie these Platforms

- Reinforcing basic cyberspace technologies (e.g., AI, network technologies, big data analysis techniques) and promoting AI-focused R&D, from innovative basic research to real-world implementation
- Reinforcing basic physical space technologies (e.g., robotics, device development, nanotech and materials technologies, photonic and quantum technologies)
  R&D focused on (1) robotics that will contribute to productivity improvements and (2) assistance robots designed to improve quality of life

“Comprehensive Strategy on Science, Technology and Innovation 2016” (Excerpt) 2/3

・Platforms for Realizing “Society 5.0” (The Super Smart Society) as a New Social Mode of Production

4） Promotion of Intellectual Property Strategies and International Standardization

- Formulating reference models for ensuring mutual connections between systems and identifying areas of competition and areas of cooperation

5） Promotion of Regulatory and Institutional Reforms and Cultivation of Social Acceptance

- Putting in place the necessary rules for the real-world implementation of goods and services

- Implementing comprehensive research through STI advances that involves both the industrial and academic sectors and is inclusive of ethics, laws, and social impact (ELSI) perspectives

6） Promotion of Capacity Development and Personnel Training

- Implementing personnel training as a means of ensuring cybersecurity against increasingly sophisticated threats

- Extending the motivations, skills, and talents of young students through highly advanced science and technology, science and math education, and information literacy

“Comprehensive Strategy on Science, Technology and Innovation 2016” (Excerpt) 3/3

Intelligent Transport Systems (ITS)

1) Intensive initiatives to tackle priority challenges pertaining to the development of an automated driving system (including SIP and Convention Project (4))

- Development of dynamic maps, establishment of management and delivery technologies
- Study and development of HMI, basic research on driver circumstances

2) **Promotion of large-scale field operation tests** pertaining to an automated driving system (including SIP and Convention Project (4))

- Planning, proposal, and execution of large-scale field operation tests to begin in FY2017 for the early identification of specific issues concerning acceleration and integration of R&D, technical and institutional aspects, etc.

3) Initiatives for **Society 5.0** (including SIP)

- Study of dynamic maps to serve as a **shared platform** for the **integration** of various data on **a map base**.
- Promotion of cooperation with other fields, **substantiation of user cases through the sharing and study of information** pertaining to data specifications and formats, identification of issues, promotion of innovative basic research, etc.

4) **Development of related technologies and systems** to support the automated driving system, advancement of **verification**, **establishment of applied implementation and business models** (including SIP and Convention Project (4)

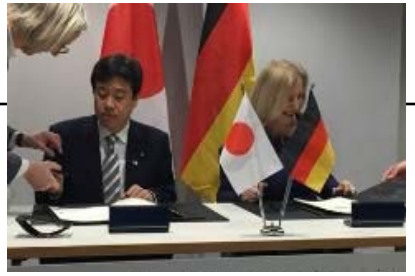
- Development of related technologies and systems to support the automated driving system, advancement of verification
- Applied implementation of the automated driving system in response to various needs, establishment of business models

5) Main initiatives for **real-world implementation**, etc. (including SIP)

- **Improvement of social acceptance** through large-scale field operation tests
- **Development of environmental aspects**, such as the legal system, as necessary
- **Consolidation of domestic/international collaboration and cooperation**, **promotion of international standardization**

Japan-Germany Joint Declaration of Intent on promoting R&D on automated driving system technology

- On January 12, 2017, Minister of State for Special Missions (Science and Technology Policy) Yosuke Tsuruho met with Johanna Wanka of the German Federal Ministry of Education and Research (BMBF) in Berlin, Germany, where he signed a Joint Declaration of Intent on the Promotion of Research and Development R&D on Automated Driving Technologies.
- Japan will use this Joint Declaration as the basis for working in coordination with Germany's BMBF in promoting R&D on automated driving technologies.



Key points of the Joint Declaration of Intent

■ Japan and Germany have a shared recognition of the significance and importance of automated driving systems.

- ○ Automated driving systems bring about reductions in road traffic accidents and provide new transport measures for all.
- ○ Regarding R&D activities for automated driving systems, it is important for both Japan and Germany to facilitate coordination and cooperation.

■ **Japan and Germany will engage in mutual sharing of initiatives, such as field operation tests, in their respective countries** with an eye to future coordination.

- ○ Beginning in September 2017, Japan plans to start a large-scale field operation test through an R&D project for automated driving systems under its "Cross-ministerial Strategic Innovation Promotion Program (SIP)," and has called for the participation of overseas experts.
- ○ The BMBF of Germany promotes R&D projects and works in close cooperation with responsible ministries and agencies, and will communicate Japan's invitation to participate in SIP's large-scale operation test.

■ Cabinet Office and the BMBF will conduct consultation and coordination with relevant stakeholders, and will **give substantive shape to German-Japanese research collaboration in R&D on automated driving technologies**.

- ○ Both sides will work out a base for specific German-Japanese research collaboration.
- ○ Concrete talks on this topic will begin within the first half-year of 2017.

Initiative to Expand Public-Private-Sector Investment in Science, Technology, and Innovation (Final Report) (Outline)

Activating Japan's Economy and Society through Science, Technology, and Innovation

■ In June 2016, the Cabinet Office **established a "Committee for Activation of Japan's Economy and Society through Science, Information, and Technology" under the Council for Science, Technology and Innovation (CSTI)** to work toward activation of the growth engines of science, technology, and innovation on the way toward realizing a 600-trillion-yen economy. The committee **prepared its final report** in December 2016.

1. Basic philosophy

■ Strengthen CSTI's "control tower" functions and aim for quantitative and qualitative expansion of the S&T budget to help realize "Society 5.0."

■ In cooperation with industrial circles, thoroughly **examine the systems and frameworks that hinder the creation of innovation** and build a mechanism for efficient distribution of resources.

■ Aim to achieve the **"target for government R&D investment (1% of GDP)"*** established in the "Science and Technology Basic Plan" and for a **three-fold increase in private-sector investment to universities and other institutions**.

Aim for 1% of GDP target while maintaining consistency with "economic and financial recovery plans." When the nominal GDP growth rate for the relevant period (FY2016 to FY2020) is estimated based on an average 3.3%, the total amount of government R&D investment that will be needed during that period becomes approximately 26 trillion yen.

2. "Three actions" for activating Japan's economy and society through science, technology, and innovation

■ Strengthen CSTI's "control tower" functions, aim for quantitative and qualitative expansions of budgets for S&T and research personnel investment, and expand the introduction of private-sector capital through institutional reform.

■ Proceed with continuous implementation that includes expansion of SIP and ImPACT and realize a stronger administrative office framework through fundamental reinforcement of the S&T and innovation budget.

Action 1: Budgeting process reform

Continue and develop SIP in ways that include introducing new promotion expenses and demonstrate synergetic effects for the dual measures.

■ **Set target fields that are highly effective in inducing private-sector investment for the public and private sectors** (also consider the contribution that using R&D outcomes has in improving the efficiency of fiscal spending). Collect proposals for related policies and measures from ministries and agencies and have CSTI select those that will be considered as candidates.

■ **The Cabinet Office covers a portion of project expenses using a new Public-Private Investment Promotion Fund for Science and Technology Innovation (provisional name).** (To be established in FY2018. The fund is envisioned as a tool to secure financial resources while sustaining and developing SIP. At that time, it will also expand private-sector investment for real-world implementation while also proceeding with a review of related policies and measures.)

■ Candidate policies and measures are handled in cooperation with the Council on Economic and Fiscal Policy, Ministry of Finance, and others to ensure that appropriate budgetary measures are implemented in the budgeting process.

■ CSTI designates **"field supervision" (provisional name) for each target field. Management having the outstanding features of the current SIP is applied.**

■ **Evaluation based on the stage-gate process** is introduced for candidate policies and measures.

*SIP: Cross-ministerial Strategic Innovation promotion Program

Action 2: Institutional reform to expand R&D investment

■ **Implement institutional reform; e.g., reform of universities to expand investment from industry.**

i. Reform universities and enhance industry-academia-government collaboration to promote open innovation.
Promote efforts to acquire various forms of investment, etc.

ii. Promote the creation of R&D-based ventures.
Promote the creation of ventures originating from national research and development agencies, etc.

iii. Expand public procurement for the creation of new markets.
Introduce mechanisms that make it easy to adopt innovative technologies, etc.

iv. Rejuvenate communities through STI.
Actively apply a corporate version of the "hometown tax payment system," etc.

v. Promote human resources investment that supports S&T innovation.
Create degree programs based on industry-academia collaboration, etc.

iv. Formulate budgets that are effective in creating S&T innovation.
Introduce the technical readiness levels (TRL), etc.

Action 3: Expansion of effective evidence-based public-private R&D investment

■ Promote effective public-private R&D investment by **establishing an evidence-based PDCA cycle and promoting the "visualization" of policy effects**.

■ **Continue systematic gathering and sharing** of outputs from inputs and information that leads to outcomes.

■ **Build evidence pertaining to important policy issues** and utilize it in policy-making.

○ **Gather holistic data and build evidence.**
Analyze S&T-related budgets, etc.

○ **Study and analyze important policy issues.**
Provide information that contributes to the setting of target fields, etc.

3. Toward activation of Japan's economy and society through science, technology, and innovation

■ Reinforce CSTI's "control tower" functions and the administrative office functions that support them, and deepen coordination with the control tower functions of other organizations.