

Under the 5th Science and Technology Basic Plan (FY2016–2020), a Comprehensive Strategy on Science, Technology and Innovation (STI) is to be approved by the Cabinet every year to present priority initiatives for the next fiscal year. In order to make Japan “the most innovation-friendly country in the world,” the following initiatives shall be promoted.

Items in **RED** mainly indicate new and important matters in the Comprehensive Strategy for 2017

## Chapter 1 Priority Matters

Matters that are particularly important for becoming a global leader in the realization of Society 5.0:

### (1) Realizing Society 5.0

- Bringing together government, industry and academic sectors and promoting public engagement
  - Encouraging ambition in younger researchers and start-up companies
- Thoroughly implementing efforts by relevant ministries and agencies, all the way from basic research to practical application (e.g., by reinforcing basic technologies and promoting initiatives in connected industries)
  - Promoting SIP (Strategic Innovation Promotion program) in step with the direction of initiatives in the relevant ministries and agencies
- Sharing the concept of Society 5.0 with the world
  - Building platforms for utilizing big data in support of a knowledge-based society

### (2) Steady Implementation of the “Public & Private Investment Expansion Initiatives for STI”

3 actions to raise Japan’s GDP to 600 trillion yen by reinforcing the “control tower” role of the Council for Science, Technology and Innovation (CSTI):

#### ① Budget-Making Process Reform Action ※ 1

- Establishing a fund for PRISM (Public/Private R&D Investment Strategic Expansion Program) that will encourage private investment in R&D by leveraging government investment in R&D while stimulating the synergistic effects between PRISM and SIP
- Identifying “R&D investing target areas” and encouraging government ministries to target these areas in their respective R&D measures and policies
- Rolling out SIP-type management in individual ministries and introducing Stage-Gate evaluation
  - reinforcing the CSTI’s “control tower” role

#### ② Systemic Reform Action ※ 2

- Blanket enforcement of reforms to universities and national research institutes without exception (escaping from “stewardship” to “management”)
- Promoting full-scale “organization-to-organization” collaboration between industry and academia
- Enhancing efforts to acquire diverse funds (e.g., more effectively utilizing assets held)
- Expanding contributions including valuation assets (e.g., real property, shares)
- Training and strengthening small and medium start-up companies by taking advantage of public procurement
- Promoting the effective matching of seed technologies and market needs by venture stakeholders and other investors
- Promoting the use of STI in regional revitalization
- Promoting the development of STI personnel through partnerships between industry, academia, and government

### ③ Evidence-Based Investment Action ※ 3

- Achieving the “visualization” of government R&D investments and policy effects and implementing appropriate resource allocation and evaluation
- Building and applying an evidence system that offers determinants for important policy tasks
- Continuous examination of indicators based in the Basic Plan, with follow-up by grasping and publishing the data
  - Building a system for Plan-Do-Check-Act (PDCA) Cycle to implement policies based in objective evidence

### (3) Steady Implementation “Towards Achieving Government R&D Investment Target and Promoting Society 5.0”

- Identifying projects expected to contribute to STI (including those aiming to realize Society 5.0 by introducing STI elements into existing projects)
- Working with the Ministry of Finance to ensure that priority is given to the identified programs in budget formation process
  - striving to secure budgets of the necessary scale in achieving the government R&D investment target (1% of GDP)
- ※1 Of the technical fields included in the system for the realization of Society 5.0 listed in Chapters 2 and 3, the selected target areas are those in which government R&D investment to encourage private investment is expected to be most effective.
- ※2 Items listed as specific measures in Chapters 4 and 5 include the diversification of funding sources by strengthening the acquisition of external funding and the integrated promotion of research funding reforms together with the reform of national universities and national research institutes.
- ※3 Items listed as specific measures in Chapter 6 include the promotion of effective evidence-based STI policy and the strengthening of the “control tower” role.

### What is Society 5.0?

A vision of future society presented in the 5th Science and Technology Basic Plan: Following on from hunting-and-gathering society, agrarian society, industrial society, and information society, “Society 5.0” refers to a new mode of socio-economy with the following characteristics:

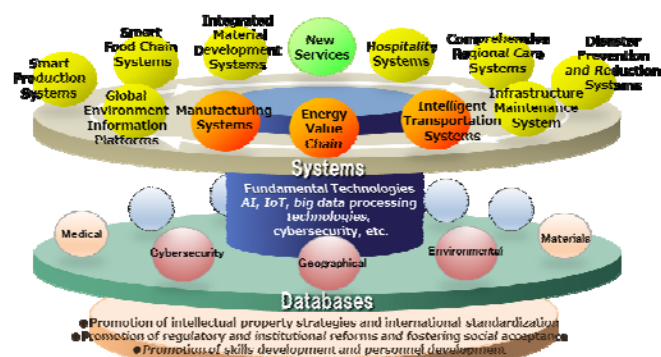
- ① Achieved through the high degree of merging between cyberspace and physical space.
- ② Provide goods and services that granularly address manifold latent needs regardless of region, age, gender, language, or any other limitation, to achieve economic growth while simultaneously overcoming societal challenges.
- ③ Bring about a human-centered society in which people can lead high-quality lives full of comfort and vitality



Image of Society 5.0

Note: In addition to the above, it will also be important to establish a research environment that will facilitate the creation of centers of research excellence and a diverse body of academic research.

## Chapter 2 Acting to Create New Value for the Development of Future Industry and Social Transformation



Representation of Platforms for Realizing Society 5.0

### (1) Fostering R&D and Human Resources that Boldly Challenges the Future

- Further development through continuous improvements in the operation of ImpACT (Impulsing Paradigm Change through Disruptive Technologies)
- Promotion of the development of programs to encourage challenging R&D

### (2) Platforms for Realizing “Society 5.0” as a New Mode of Socio-Economy

- Building platforms to facilitate the creation of new value
- The development of “Intelligent Transport Systems,” “Optimizing the Energy Value Chain”, and “New Manufacturing Systems” as core systems

#### ① Construction and Utilization of Databases as a Foundation for the Creation of New Values and Services

- Advance promotion of the construction and use of the following databases that can be used in common (as well as in relevant measures of SIP)
- Building a “geographical database” based on geospatial data and maps for autonomous vehicles, an “environmental database” using satellite and weather data, and a “cybersecurity database” that will be helpful for collecting information on cyber attacks, etc.

### ② Consolidating Fundamental Technologies that Support Platforms

- Reinforcing fundamental cyberspace technologies (e.g., AI, network technologies, big data analysis technologies)
- Adopting the industrialization roadmap formulated by the Strategic Council for AI Technology as a national strategy, leading a government-wide drive to make progress on R&D and social adaptation
- Reinforcing fundamental physical space technologies (e.g., robotics, device development, nanotech and materials technologies, photonic and quantum technologies)

### ③ Implementation of Intellectual Property Strategies and International Standardization

- Defining spheres of competition and cooperation
- Promotion of database construction and standardization in areas such as interfaces that promote database utilization and data formats

### ④ Promotion of Regulatory and System Reforms and Fostering Social Acceptance

- Advance examination of the review of systems and formulation of rules based on challenges when utilizing AI and robots in the field
- Comprehensive implementation of research involving both the industrial and academic sectors that includes consideration of ethical perspectives and the social impact of advances in STI

### ⑤ Promotion of Capacity Development and Personnel Training

- Training personnel who will be responsible for creating new business through IoT and other innovative technologies
- Training cybersecurity personnel to address sophisticated threats
- Promoting and training personnel in the mathematical sciences, including computational science and technology and data science

## Chapter 3 Addressing Economic and Social Challenges

### (1) Sustainable Growth and Self-sustaining Regional Development

#### ① Ensuring Stable Energy, Resources and Food

##### i) Optimization of Energy Value Chain

(building energy platforms / stabilizing and reducing the cost of clean energy supply / stabilizing energy usage by leveraging innovative technologies and storage batteries toward achieving a hydrogen energy-based society / the broad-based application of innovative materials and devices / promoting the National Energy and Environment Strategy for Technological Innovation towards 2050)

##### ii) Smart Food Chain Systems

(the high-level utilization of biological functions with biotechnology / next-generation breeding systems / needs-oriented production systems / processing and distribution systems / systems for transmitting valuable information to end users and consumers)

##### iii) Smart Production Systems

(improving productivity by utilizing AI, IoT, big data analysis, etc.)

#### ② Achieving a Sustainable Society to Handle Hyper-Aging, Depopulation, Etc.

##### i) Establishment of a Society in Which People Enjoy Long and Healthy Lives with World-Leading Medical Technology

##### ii) Intelligent Transport Systems

(beginning large-scale field operating tests for automated driving systems / promoting the development and demonstration of related technologies and systems / establishing application implementations and business models)

##### iii) Systems for Community Living to Foster a Health-Oriented Nation (e.g., Promotion of Comprehensive Community Care Systems)

(promoting the utilization of health information through the use of ICT and other technologies / assistive technologies that improve nursing and other care-based services and promote autonomy for individuals who need support / research that will contribute to accessible and humane residences and community development)

#### ③ Improving Competitiveness in Manufacturing and Value Creation

##### i) New Manufacturing Systems

(building supply chain systems platforms / developing innovative production technologies)

##### ii) Integrated Material Development Systems

(building highly reliable material databases / establishing high-speed, high-efficiency prototypes, as well as measurement and evaluation technologies)

### (2) Ensuring Safety of Society for Our Nation and its Citizens and a High-Quality, Prosperous Way of Life

#### ① Maintenance, Upgrading and Management of an Efficient and Effective Infrastructure

(technologies for accurately assessing structural deterioration and damage / evaluation technologies to judge the importance of repairs and upgrades / technologies for providing structures with strength and durability / construction of asset management systems)

#### ② Attaining a Resilient Society against Natural Disasters

(improvement of “preventive capabilities”, “predictive capabilities”, and “responsive capabilities” / promoting the introduction of a collaborative scheme for sharing disaster information among government ministries and agencies)

#### ③ Addressing National Security Issues

(security / counterterrorism)

#### ④ Hospitality Systems

(multi-lingual speech translation systems / spatial imaging systems)

### (3) Addressing Global Challenges and Contributing to Global Development

(Developing the Global Environmental Information Platform / building information platform to promote conservation of biodiversity)

### (4) Pioneering Strategically Important Frontiers

(e.g., putting in place relevant regulations in preparation for the expansion of the commercial space industry)

## Chapter 4 Reinforcing the “Fundamentals” for STI

### (1) Developing High-Quality Human Resources

#### ① Developing, Securing and Improving Career Prospects of Human Resources as Intellectual Professionals

• Promoting leading-edge personnel policies at national universities and national research institutes

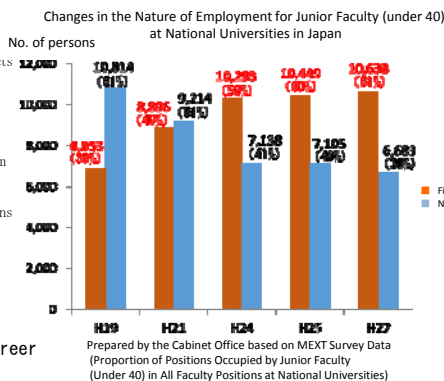
(e.g., by increasing indefinite-term contracts for younger researchers currently under fixed-term contracts)

• Securing indefinite-term posts for younger researchers

by promoting organizational self-renewal (e.g., by modifying the appointment system for senior researchers to fixed term contracts)

• Promoting investment in R&D collaborations by industry and academia that contribute to human resources development

• Reinforcing educational research and R&D that make full use of regional strengths



#### ② Promoting Diversity and Career Mobility

• Promoting the appointment of women in leadership positions,

and creating environments conducive to continued and active participation by women

• Strengthening systems for hosting superior researchers from overseas and creating environments that will encourage them to settle in Japan

• Promoting the introduction of systems that promote the mobility of personnel between the various sectors of industry, academia, and government (e.g., cross-appointment systems)

### (2) Promoting Excellence in Knowledge Creation

#### ① Promoting Academic and Strategic/On-Demand Basic Research as Sources of Innovation

• Accelerate efforts by universities and national research institutes to implement reforms (e.g., strategic management) and attract investment in basic research by building partnerships with the private sector

#### ② Strategic Enhancement of Common-Platform Technology, Facilities, Equipment, and Information Infrastructure Supporting R&D Activities

• Strengthening and sharing information infrastructure tailored to big data

#### ③ Promotion of Open Science

• Responding to international regulatory initiatives in knowledge-based societies and opening research results using public funds (e.g., by developing data platforms)

### (3) Strengthening Funding Reform

#### ① Fundamental Funds Reform

• Promotion of reform initiatives through the leadership of the presidents of universities and national research institutes

#### ② Diversification of Funding Sources by Strengthening the Acquisition of External Funding

• Cultivating a culture and environment of donations by strengthening relationships between universities and alumni associations  
 • Analyzing ways to expand the contribution of evaluation assets (real property, stocks, etc.) and examining how to simplify the donation of valuation assets  
 • Gathering and disseminating case studies of universities that have enjoyed success in acquiring external funding  
 • Promoting the utilization of assets held by national universities, improving the functionality of facilities by enacting countermeasures against aging, and promoting them to be loaned out to start-up companies as incubation facilities

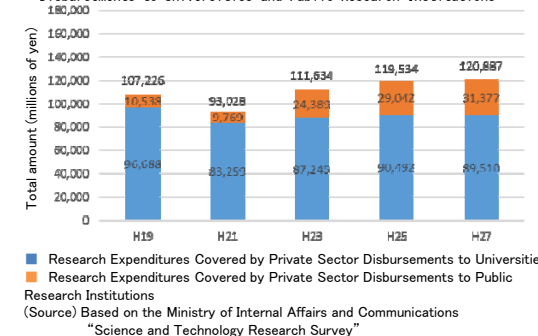
### ③ Reform of Open-Application Research Funding

• Realizing effective and efficient budget execution through open-application research funding

### ④ Integrated Promotion of Research Funding Reforms alongside Reforms to National Universities and National Research Institutes

• Examining how to further utilize the investment capabilities of national research institutes  
 • Examining the possibilities of long-term ownership and stocks or stock options as compensation  
 • Promoting operational improvements that will enable national universities to use their own income more effectively and efficiently and examining the application of this model to national research institutes

Total Amount of Research Expenditures Covered by Private Sector Disbursements to Universities and Public Research Institutions



## Chapter 5 Establishing a Systemic Virtuous Cycle of Human Resources, Knowledge and Capital, for Innovation

### (1) Enhancing Mechanisms for Promoting Open Innovation

• Promoting large-scale organization-to-organization joint research projects involving industry, academia, and government including regional universities and small and medium enterprises (SMEs)

• Organizing researchers across departments and offering support for setting up organizations to facilitate the centralized management of R&D

• Promoting the effective matching of seed technologies and market needs by the people involved in venture business and other investors

• Bringing together key players from the industry, academia, government, and finance sectors in Japan and overseas to form a hub for the integrated development of interdisciplinary R&D, commercialization, and personnel training

### (2) Enhancing the Creation of SMEs and Startup Companies to Tackle New Business Opportunities

• Expanding the human resource base of entrepreneurially minded people throughout the education system, from elementary, secondary and high school to university

• Promoting initiatives aimed at encouraging the creation of startup companies at universities and national research institutes

• Cultivating and strengthening SMEs and startup companies by taking advantage of options such as public procurement

• Building a database of university-led ventures and promoting initiatives to match these with venture capital

### (3) Reviewing and Improving IP and Standardization Strategies and the Regulatory Environment for Innovation

• Building intellectual property systems to respond to developments in big data, AI, and related fields from an international standpoint

• Addressing changes in international standardization such as the training to nurture the relevant professionals and in strategic standardization activities

• Promoting regulatory and institutional reforms with a view to the realization of Society 5.0 and fostering social demand that is inclusive of ELSI (Ethics, Laws, and Social Impact) perspectives

### (4) Developing Innovation Systems that Contribute to “Regional Revitalization”

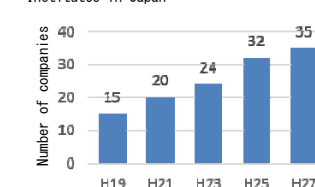
• Discovering and supporting the consistent growth of core enterprises that will be a driving force for local economies

• Promoting regional revitalization through STI measures based on a commitment to the particular strengths and characteristics of local areas

### (5) Cultivating Opportunities for Generating Innovation in Anticipation of Global Needs

• Building analytical systems oriented to the creation of new business and R&D that anticipates global needs

Trends in the Number of IPOs by Start-Up Companies\* Launched at Universities and National Research Institutes in Japan



Prepared by MEXT and the Japan Science and Technology Agency (JST)  
 • Companies started based on the results of research conducted at universities or national universities (excluding delisted companies)

## Chapter 6 Enhancing Functions for Promoting STI

• Blanket enforcement of reforms to universities and national research institutes without exception

• Accelerating the government procurement procedures in consideration of the nature of R&D (fast-tracking, etc.)

• Promoting effective evidence-based STI policy and the strengthening of the CSTI’s “control tower” role