Where Do We Come From? What Are We? Where Are We Going?
- A Japanese Perspective on Japanese Science and Technology Policy

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The Embassy of Japan in Canada
Oct. 2^{nd}, 2010
JSAC 2010 at Vancouver

(Where Do We Come From? What Are We? Where Are We Going?, Paul Gauguin, 1897)
Contents

■ Where Do We Come From?
  - History of Science and Technology Policy in Japan
  - The 3rd S&T Basic Plan
  - Japan’s Excellence

■ What Are We?
  - Government Structure of S&T Policy
  - Current Situation of S&T in Japan

■ Where Are We Going?
  - A Future Direction
  - My perspective on Japanese S&T policy issues to be tackled in the future

■ Summary
Self-Introduction

- A science attache in the Embassy of Japan, Canada
- Originally from the MEXT (MEXT: the Ministry of Education, Sports, Culture, Science and Technology)
- A government officer about S&T Policy and Nuclear R&D Policy for peaceful-use.
- Born in 1976.
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■ Summary
History of Science and Technology Policy in Japan

- S&T Basic Law (November, 1995)
- S&T Basic Plan
  - The 1st (FY1996 - FY2000)
  - The 2nd (FY2001 - FY2005)
  - The 3rd (FY2006 - FY2010)

- Changes of Administrative System
  - Establishment of Council for S&T Policy (CSTP) (January, 2001)
  - Reorganization of Central Government Ministries (January, 2001)
  - Incorporation of National Universities (April, 2004)
  - Incorporation of National Research Institutes

4 priority promotion areas
(Life sciences, ICT, Environmental sciences, Nanotech & materials)
4 promotion areas
(Energy, Manufacturing technology, Social infrastructure, Frontier)
History of Science and Technology Policy in Japan – toward 4th Plan

Science & Technology Basic Law (enacted in 1995)
Council for Science & Technology Policy (established in 2001)

1st Basic Plan (FY 1996-2000)
- Increase in governmental R&D expenditure
- Enhance competitive research funds
- Total budget 17 trillion yen

2nd Basic Plan (FY 2001-2005)
- Effective/efficient resource allocation
- Strategic priority setting
- Total budget 24 trillion yen

3rd Basic Plan (FY 2006-2010)
- Benefit society to be supported by public
- Foster human resources and competitive research environments
- Total budget (targeted) 25 trillion yen

4th Basic Plan (FY 2011-2015) is now under consideration (to be endorsed by the Cabinet in March 2011).
Prioritized Promotion at 3rd S&T Basic Plan

Prioritized 4 research areas
- Life sciences
- ICT
- Environment
- Nanotechnology/Materials

Promoted 4 research areas
- Energy
- Monodzukuri (Manufacturing)
- Social infrastructure
- Frontier

Key technologies of national importance
- Next-generation supercomputer
- X-ray Free Electron Laser (XFEL)
- Fast Breeder Reactor (FBR) cycle technology
- Space transportation system: ISS “KIBOU”, et al
- Global oceans observation system
In November 2007, Kyoto University’s Professor Shinya Yamanaka announced his success in creating human induced Pluripotent Stem (iPS) cells.

This is the first achievement in the world following the success with mice presented in August 2006.

In vivo differentiation (teratoma formation assay)

iPS cell differentiated into the various tissues of the three germ layers!

⇒ Confirm the pluripotency of iPS cells

Application for Regenerative medicine
Japan’s Excellence: Aerospace activities

International Space Station (ISS) Japanese module

- **Japanese experiment module “KIBO”**
  is Japan’s first manned facility where astronauts can conduct various experiments which many countries are interested in, under the special environment in space. Kibo’s docking and assembly operations to the ISS have been completed in July 2009.

Launch vehicles and space transportation systems

- **HTV (H-II Transfer Vehicle)**
  was successfully berthed at the ISS on September 2009. HTV will be the only logistic carrier which is capable of supplying a total of six tons of pressured and unpressured cargo after the retirement of the Space Shuttle.
**Japan’s Excellence: Nanotechnology**

**Discovery of carbon nanotube**

Promising for next-generation electronics, energy, environment, IT, medical etc.

**Superconductors incorporating magnetic element**

**Discovery of photocatalyst**

Photocatalyst functions

- Air purification
- Water purification
- Self-cleaning
- Antimicrobial action and disinfection/sterilization

**High performance magnetoresistive devices**

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- Summary
Japanese Government structure of S&T policy

Cabinet

Cabinet Office

M E X T (Ministry of Education, Culture, Sports, Science and Technology)
- Basic science and research
- Universities
- National research institutes
- Research funding

M O F A (Ministry of Foreign Affairs)
- Science and technology diplomacy

M E T I (Ministry of Economy, Trade and Industry)
- Industry research
- National research institute

CSTP (Council for Science and Technology Policy)
- Making S&T and Innovation Policy

SCJ (Science Council of Japan)
- Academic Opinions

National Universities
- JSPS
- JST
- RIKEN
- JAXA
- JAEA
- NIMS
- NIRS
- NIED
- NEDO
- AIST

Government

Academia

Funding agency

National research institutes
### Japan S&T-Related Budget in FY2010

<table>
<thead>
<tr>
<th>Ministry</th>
<th>S&amp;T-Related Budget (tri JPY) (bln USD)</th>
</tr>
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<tbody>
<tr>
<td>MEXT</td>
<td>2.32 (23.2)</td>
</tr>
<tr>
<td>METI</td>
<td>0.54 (5.4)</td>
</tr>
<tr>
<td>MOD</td>
<td>0.17 (1.7)</td>
</tr>
<tr>
<td>MHLW</td>
<td>0.15 (1.5)</td>
</tr>
<tr>
<td>MAFF</td>
<td>0.12 (1.2)</td>
</tr>
<tr>
<td>Others</td>
<td>0.28 (2.8)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3.59 (35.9)</strong></td>
</tr>
</tbody>
</table>

**NOTE** The exchange rate: 1 USD = 100 JPY
# Some S&T Indicators Comparison Between Canada and Japan

<table>
<thead>
<tr>
<th></th>
<th>Canada</th>
<th>Japan</th>
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<tbody>
<tr>
<td><strong>R&amp;D amount (total)</strong></td>
<td>¥ 2.5 trillion (CAD 29.8 billion)</td>
<td>¥ 18.8 trillion</td>
</tr>
<tr>
<td><strong>Ratio of expenditure by the Government</strong></td>
<td>24.2 %</td>
<td>17.8 %</td>
</tr>
<tr>
<td><strong>Ratio of R&amp;D expenditure against GDP</strong></td>
<td>1.95 %</td>
<td>3.44 %</td>
</tr>
<tr>
<td><strong>Number of researchers</strong></td>
<td>143 thousands</td>
<td>656 thousands</td>
</tr>
</tbody>
</table>
New Growth Strategy (June, 2010. Cabinet Decision)

Growth boost led by demand-side policy measures

Green Innovation
- Rapid increase in renewable energy by introducing feed-in tariff system
- “Future City” Initiative
- Forest and forestry revitalization plan

Life Innovation
- Medical institution selection system to promote practical application of new medical care
- Medical interaction (acceptance of foreign patients)

Tourism-oriented nation and local revitalization
- Introducing a “comprehensive special zone system” and promoting full open skies
- The “Program to Boost the Annual Foreign Visitor Number to 30 Million” and promotion of staggered holidays
- Doubling the size of the existing housing and remodeling markets
- Opening public facilities to the private sector and promoting projects by using private sector funds

Growth boost led by supply-side policy measures

Science-and-technology - IT oriented nation
- “Leading graduate school” and other schemes to enhance international competitiveness and foster human resources
- Promoting utilization of information and communication technologies
- Enhancement of R&D investment

Employment and human resources
- Integration of kindergartens and nursery schools, etc.
- Introduction of the “Career Grading” system and “Personal Support “system
- New concept of public service

Financial Sector
- Establishment of an integrated exchange (securities, financing and commodities)
Main Issues of 4th S&T Basic Plan (Draft)

Basic concept

Positioning of Basic Plan in National Strategy
- A five-year-plan with the foresight of 10 years ahead, based on “New Growth Strategy”.
  Comprehensive promotion of science, technology and innovation policy

Promotion of two major innovation as the national strategic pillar

Green Innovation
- To realize low carbon society with sustainability
  - Renewable energy, Low carbon of energy supply and demand, Saving energy, Green infrastructure
  - Accelerate innovation by affirmative legal framework
  - Establish “National Lab” with proper regulation easing
  - Develop strategies for the international standardization

Life Innovation
- To realize high quality of life in an aging society
  - Promotion of preventive medicine, Development of innovative diagnostic and treatment method,
    Development of life-supporting technology for elderly and challenged people
  - Promote translational research
  - Promote regulatory science
  - Accelerate innovation by affirmative legal framework

The new device which promotes creation of the innovation
- To construct the system which create issue-solving innovation
  - Establish Innovation Strategy Platform
  - Establish Open Innovation Centers
  - Create a new market by the new affirmative legal framework

Provisional Translation
Main Issues of 4th S&T Basic Plan (Draft)

Promotion of R&D which sustains the nation and produces new advantage

- Bases for the high quality of life
  - Maintain necessities: food/resources/energy
  - Maintain safe life

- Bases for the industry
  - Extend advantage of Japan
  - Create new advantage for the future

- Bases for the nation
  - Maintain a technology bases for security
  - Develop a new frontier

- Common Bases for R&D
  - Maintain cross-sectional key technologies
  - Establish hubs of advanced R&D

Drastic Reinforcement of S&T Potential

- Drastic reinforcement of basic research
  - Reinforce basic research based on originality/variety
  - Reinforce the world top-level basic research
  - Form the group of “Research Universities”
  - R&D Hub for International research network

- Reinforcement of human capital for S&T
  - Drastic reinforcement of the graduate school education

- Formation of research environment of international standard
  - Domestic/international maintenance and utilization of large research facilities

- International openness integrated with world vitality
  - “East-Asia Science and Innovation Area” Initiative
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- **Summary**
A future direction

- More focus on policy of S&T innovation
- More focus on R&D in the fields of Environment, Clean Energy and Life Sciences where new markets will be created
- Constructing the S&T system which will create issue-solving innovation (including integrated roadmap)
- Increasing investment on S&T human resources
- Close cooperation between industry and academia, and establishment of technology clusters
My perspective on Japanese S&T policy issues to be tackled in the future

☐ Formation of Science and Technology Stakeholders
   (Importance of S&T Stakeholder involvement on S&T policy making process)

☐ Increasing investment on basic science and research
   (Innovation means the creation of new values, not just commercialization)

☐ Strategic establishment and utilization of S&T infrastructure
   (formation of COE and international network, utilizing S&T infrastructure)

☐ International cooperation between Canada and Japan
   (common benefits for both countries)
Summary

- Japan has achieved much success on S&T, placing great importance on, and investing in this field.

- Now, we are facing on a critical turning point at which the draft 4th S&T basic plan is being considered.

- It is common sense for S&T policy officers in each country that it is important to make the best circumstances to create ‘innovation’ in my own country.

- However, there are many insights and issues to be tackled in the future for S&T policy. The recommendations of S&T policy from academia would be of great effect to establish ‘Science and Technology Country’.

- Needless to say, it is of quite importance to establish strategic international S&T cooperation. We will discuss about it in Canada-Japan Joint Committee on S&T, which will be held at Ottawa on Nov. 9.
Thank you for your attention!

If any questions, please contact...

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Science and Technology Cooperation

Strategic International Cooperative Program (SICP)

- Mutually complementary research collaboration with institutes in counterpart countries in fields with strategic importance for both Japan and counterpart countries
- Strategic promotion of international research exchange and joint research

S&T Research Partnership for Sustainable Development (SATREPS)

- Research collaboration with the institutes in developing countries for mutual benefit
- Reinforcement of capacity in developing countries to find solutions for problems by their own
Strategic International Cooperation Program (SICP)

1. **Research exchange**

2. **Joint research**

**Japan (MEXT)**

- Notice (Country and field of cooperation)

**JST**

- Application
  - Support

**Researchers (Japan)**

**Agreement**

**Ministry/Agency of the counterpart country**

- Notice (Implementation policy)

**Counterpart Funding agency**

- Application
  - Support

**Researchers (counterpart country)**

- Joint call, Joint review, Joint interview etc.
S&T Research Partnership for Sustainable Development (SATREPS)

MEXT/JST

Support

MOFA/JICA

Technical cooperation

collaboration

International joint research

Research Institutions in Japan

Research Institutions in Developing Countries

Research partnership
Trend in the S&T Budget in Japan

(Billion yen)

1st Plan (FY1996-2000)
Investment under the basic plan
Approx. 17 trillion yen
Actual budget: 17.6 trillion yen

2nd Plan (FY2001-2005)
Investment under the basic plan
Approx. 24 trillion yen
Actual budget: 21.1 trillion yen

3rd Plan (FY2006-2010)
Investment under the basic plan
Approx. 25 trillion yen