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Japan's Recovery Strategy: *Innovation Revisited*

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1. *Catch-up* and *Innovation*

“Innovation”

- Joseph Schumpeter:
  “Creative Destruction”; “evolution”
- “Make changes in something already existing, by introducing new methods, ideas or products” (G. Dosi)
- Types of Innovation:
  - new products
  - new methods of production
  - New sources of supply
  - The exploitation of new markets
  - New ways to organize business

Two Major Catch-up Periods

- The story of successful catch up with technologically advanced nations since the 19th C.
- *From Catch Up to Post-Catch Up:* Reconstruction of Post-Catch Up innovation system to meet the new challenges of *open and global innovation system*

  - 1854: End of Seclusionism
    - > Inflow of foreign business and knowledge
  - 1867: Meiji Restoration
    - > Start of industrialization efforts

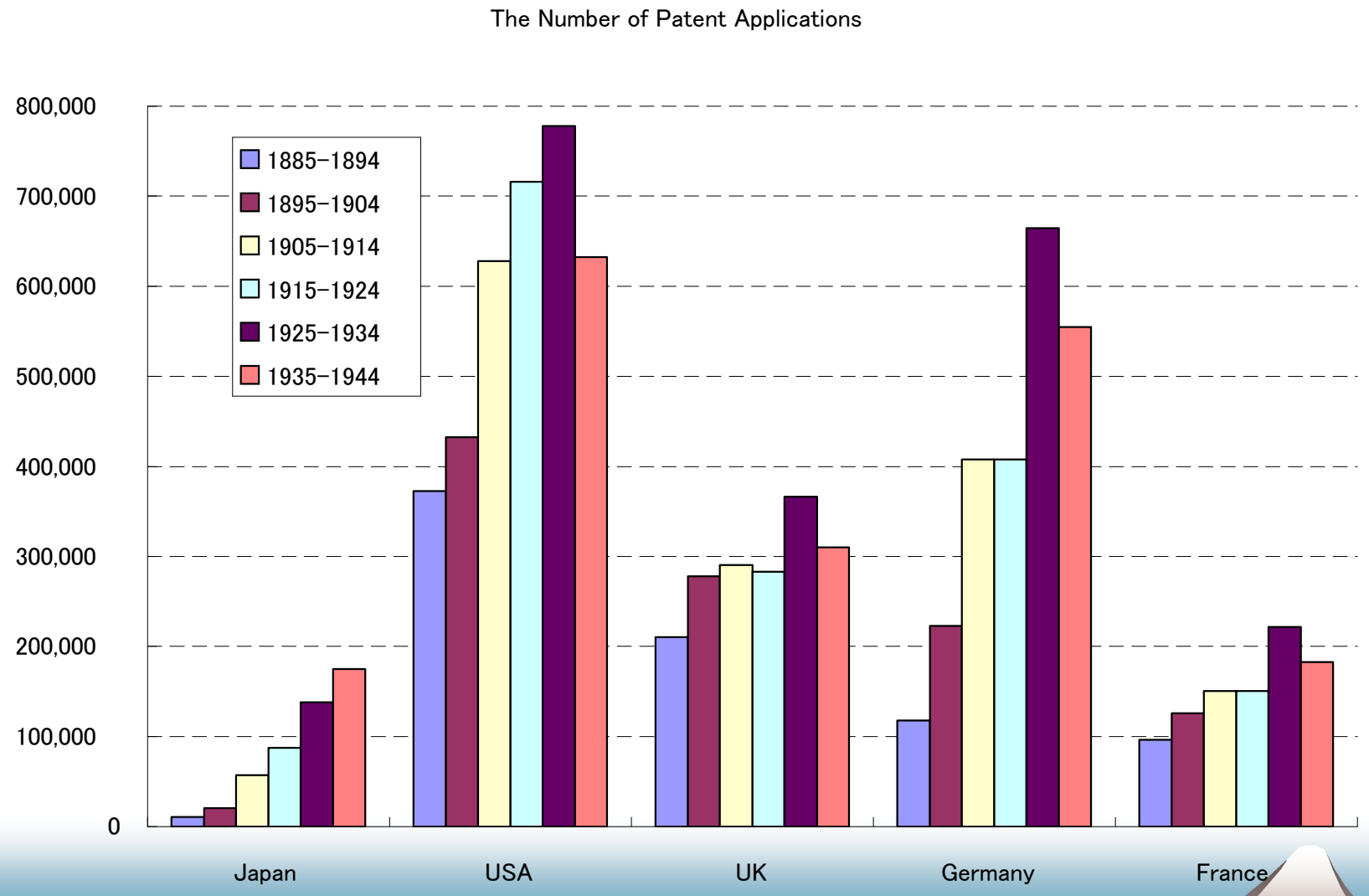
1. 1867-1945: The pre-war catch-up period
2. 1945-present (particularly till 1970s): The post-war catch-up period

(Goto, Odagiri, Sunami, Presentation at GRIPS, 2008)

The start of catch-up efforts

- Building infrastructure
  - Communication network, railway, electricity, banking system, the commercial code, etc.
- Education system
  - Elementary schools -> nearly 100% attendance ratio by the early 1900s
  - Universities, including Imperial College of Engineering
- Government investment on textile, steel, etc.
- Government and military procurement

(Goto, Odagiri, Sunami, Presentation at GRIPS, 2008)



(Goto, Odagiri, Sunami, Presentation at GRIPS, 2008)

Postwar Reconstruction of R&D System

- End of WWII->End of Military R&D, severe setback in R&D activities, 2 funding sources, Military and Zaibatsu disappeared
- Mission -> Export expansion, efficient usage of resources, increase the level of R&D

- Active technology imports (license-in of patents and knowhow), together with a rapid increase in R&D expenditures
- Restriction on imports and inward FDI (till the late 1960s)

(Goto, Odagiri, Sunami, Presentation at GRIPS, 2008)

Postwar R&D Policy 1970s – 1980s

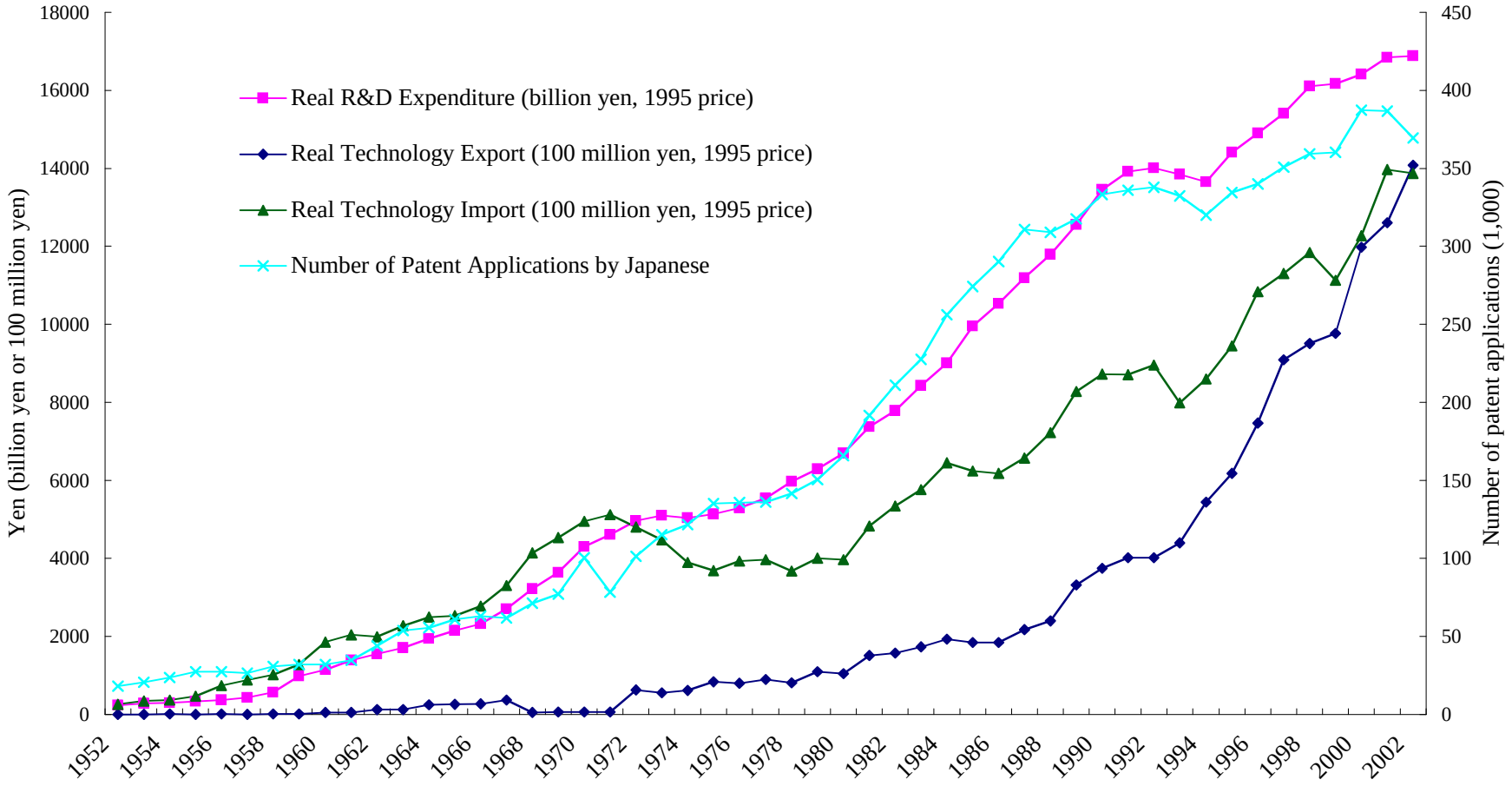
- R&D/GDP -> 3 to 3.5% target
- Limits to Growth, Solving Environment and Energy Problems, Appreciation of Yen

Development since 1990

- Increasing emphasis on science-based innovation
- Promotion of university patenting and university-industry collaborations
- Encouraging IPR Strategy

(Goto, Odagiri, Sunami, Presentation at GRIPS, 2008)

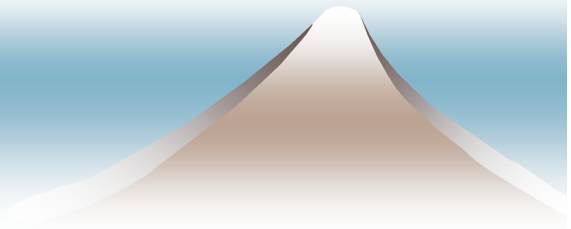
Figure 1. Trend in Innovation Activity in Japan, 1952-2002



(Odagiri, Goto, Sunami, 2010)

Rise of Technology based Innovative Companies in Japan

- Examples: Hitachi, Sony, Honda, Panasonic, Toyota……many firms
- Visionary Founders (Entrepreneurs) who understand both technology and the market with ability to articulate values/company philosophy
- Honda Soichiro as an example of Phronesis leader (Prof. Nonaka)-> *Prudence, Ethics, Practical Wisdom*
- How to maintain the DNA of the Founding Leader is the challenge -> Innovator's Dilemma
- *Waigaya – Waiwai Gayagaya*



2. Searching for the *Post Catch-up* Model:

"Green" and "Life" innovation and Reconstruction

Solve environmental problems with Innovation with *Demand Side* Innovation Policy

Developing new technology is one of the key to solve environmental problems

- Smart grid, Smart meter
- Hybrid car, electric car, New Batteries, etc.,
- Energy efficient Electric Appliances
- Renewable construction materials, smart building, smart city, Delivery and Storage

Regulation and Innovation – *Positive Regulation*

The Rebirth Strategy and Innovation

- Recovering from the 3.11 Disaster: (a) Implementing the *New Growth Strategy* focusing in the region first such as advanced IT Infrastructure, new drug and medical device R&D center, *Tohoku Medical Megabank*, (b) New Energy Strategy, renewable energy R&D and diffusion,
- Economic Growth and Managing Budget: (a) targeting 2% real economic growth, (b) tax and social security reform
- Exploring “Frontier”: (a) economic frontier - innovation, globalization and Asia, new growth financing (b) social frontier – rebuilding strong middle class, (c) global frontier - Japan brand
- “New Frontier”: a long-term vision

Background and Structure of the 4th S&T Basic Plan (2011-2015)

CSTP worked on the base of S&T Policy for coming 5 years from FY2011, toward the 4th S&T Basic Plan, to get cabinet approval

March 11	Great East Japan Earthquake
March 31	Minister of State for Science and Technology Policy and Executive Members of CSTP decided to review the previous discussion on the 4th S&T Basic Plan
August 19	The 4th S&T Basic Plan was established by the cabinet

Structure

I. Basic understanding

II. Realization of sustainable growth and development toward the future

- Realization of the restoration and reconstruction of Japan
- Promotion of Green Innovation
- Promotion of Life Innovation

III. Response to the essential issues facing Japan

IV. Enhancement of basic research and human resource development

V. Development of policies to be created and promoted together with society

(Cabinet Office)

Overview of the 4th S&T Basic Plan(1)

Ⅰ. Basic understanding

Principle

1. **Integrated development of "STI policy"**
   Change from discipline-oriented to issue-driven approach in order to focus toward strengthening of collaboration with S&T and Innovation.
2. **Further focus on the "roles of human resources and the organizations supporting them"**
   Secure human resources including world-leading young researchers and strengthen organizational support at universities, public research institutions, etc. that can assist researchers.
3. **Realization of "Policies to be created and promoted together with society"**
   Enlist their engagement in the planning policies throughout a communication with the public.

Vision of the country

① A country that restores and reconstructs from the disaster and achieves sustainable growth and development of society
② A country that realizes safe, affluent, and rewarding life for the people
③ A country that taking the initiative in solving global issues including large-scale natural disaster
④ A country possessing S&T that enables the nation to exist
⑤ A country that continues to create "knowledge" assets and fosters S&T as a culture

(Cabinet Office)

Overview of the 4th S&T Basic Plan(2)

Ⅱ. Realization of sustainable growth and development toward the future

Japan aims for realization of restoration and reconstruction from the disaster and promotion of STI toward sustainable growth and development of society in the future.

Realization of restoration and reconstruction from the disaster

Japan aims for the realization of
stabilizing living of the people, improving convenience and safety living for disaster victims.

1) Restore and reconstruct the industries of the disaster-stricken region.
2) Restore and reconstruct the social infrastructure.

Green Innovation -Toward most advanced nation in the world in terms of environment and energy-

Japan aims for the realization of low-carbon, circulating and sustainable society co-existing with nature and of good living standards for citizens.

1) Realize stable and low-carbon energy supply
2) High-Efficient and smart use of energy
3) Green the social infrastructure

Life Innovation -Toward health-oriented nation-

Japan aims for the realization of the society where the people are vigorous in body and in mind and can feel the affluence and achieve a sense of fulfillment of being alive.

1) Develop innovative preventive care
2) Develop new early diagnostic method
3) Realize safe and highly effective treatment
4) Improve Quality Of Life for elderly, people with disabilities and patients

System reforms to promote STI

- ✓ Set up the “Science, Technology and Innovation Strategy Council” (tentative name) for the better collaboration among the industry, academia and government.
- ✓ Create “a network of knowledge” among government, industry and academia.
- ✓ Establish “an open-innovation platform”.
- ✓ Promote intellectual property strategy and international standardization strategy.

(Cabinet Office)

Overview of the 4th S&T Basic Plan(3)

Ⅲ. Response to the essential issues facing Japan

✓ Identify the essential issues facing Japan except Chapter Ⅱ and focus more to promote R&D in order to achieve success in those issues
- ① Realization safe, affluent, and rewarding life for the people
- ② Strengthening the industrial competitiveness of Japan
- ③ Contribution to the solution of global issues
- ④ Maintaining the basis of national existence(Strengthening national security and critical technologies, etc.)
- ⑤ Improvement and reinforcement of common infrastructure for S&T

✓ System reform to achieve success with essential issues
- Establish a project for R&D requiring governmental initiative("National Security / Critical Technology Project(tentative name)")

✓ Strategic development of international activities in close cooperation with other countries
- Promotion of R&D for solving common issues in Asia("East Asia Science & Innovation Area", etc.)
- New development of S&T diplomacy(Development of international activities taking advantage of the strengths of Japan, etc.)

(Cabinet Office)

Overview of the 4th S&T Basic Plan(4)

Ⅳ. Enhancement of basic research and human resource development

✓ Continuous enhancement of basic research
- Enhancement of creative diversified basic research(Expansion of Grants-in-Aid for Scientific Research, etc.)
- Enhancement of basic research at the world's top level(Forming a group of research-focused universities, etc.)

✓ Development of human resources for S&T
- Reform of graduate school education(enhancement of course work, dialogue between academia and industry, etc.)
- Improvement of career paths for young researchers
- Support for the activities of female researchers(setting of the target to 30%)
- Enhancement of science education for the youth

✓ Sustaining of the world’s top level research environments and infrastructure
- Sustaining of facilities and equipment at universities, Promoting joint use of advanced research facilities and equipment, Formulating a new "Intellectual Infrastructure Development Plan“, etc.

(Cabinet Office)

Overview of the 4th S&T Basic Plan(5)

Ⅴ. Development of policies to be created and promoted together with society

Promote efforts to obtain the understanding, support, and trust of the public in order to realize "Policies for society and the public".

- ✓ Further involvement of the public with policy planning and promotion, Promotion of S&T communication activities including risk communication.
- ✓ Policy planning and enhancement of promotional functions(the "Science, Technology and Innovation Strategy Council" (tentative name) , etc.).
- ✓ Enhancing the assessment and allocation functions in the research funding system.
- ✓ Enhancement of R&D implementation system(Establishment of a new system concerning national R&D institutions).
- ✓ Establishment of PDCA cycle in S&T innovation policy.

  etc.

(※Review the contents of this plan as needed in accordance with the results of examinations of other government plans, such as "the Strategic Energy Plan of Japan".)

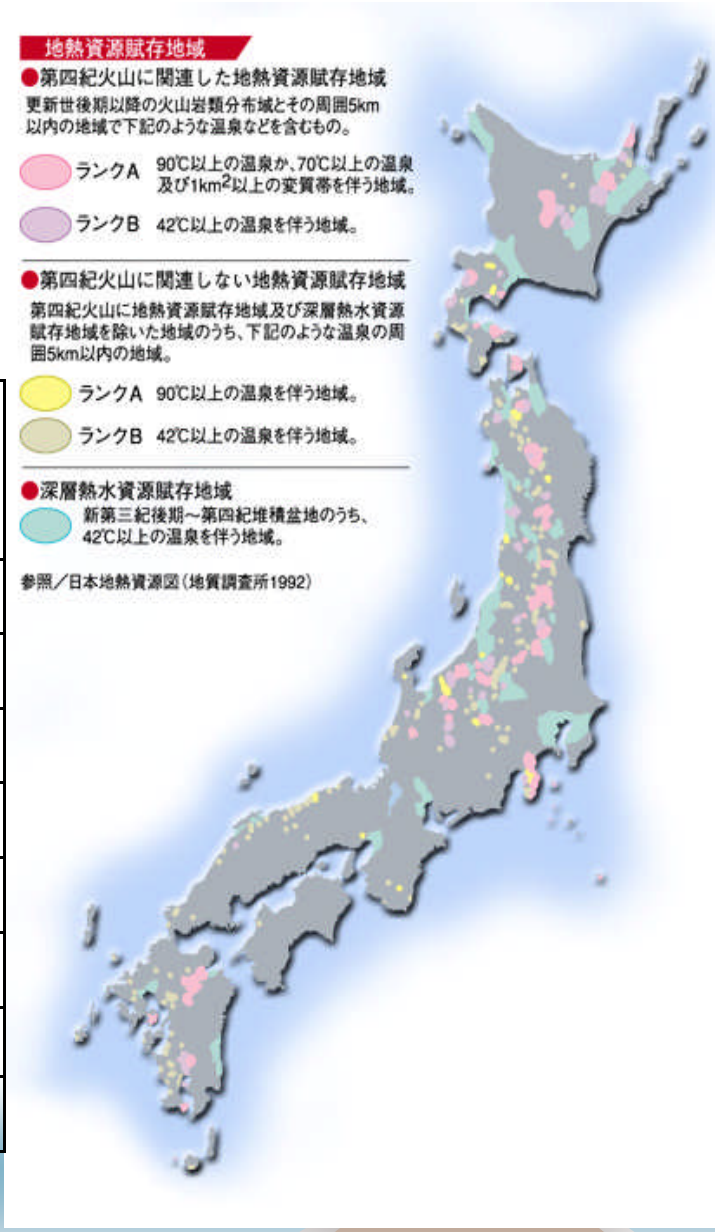
Expansion of R&D Investment

- ◆ R&D investment (from the government and private sectors): higher than 4% of the GDP.
- ◆ The government's investment in R&D: about 25 trillion yen (≒1% of the GDP).

(Cabinet Office)

Japan ranks top three in the world for geothermal capacity

	Active Volcano	Resource (MWe)	Production in 2010(Gwe/hr)
US	**160**	**30,000**	**16,603**
Indonesia	**146**	**27,790**	**9,600**
Japan	**119**	**23,470**	**3,064**
Philippines	47	6,000	10,311
Mexico	39	6,000	7,047
Iceland	33	5,800	4,597
New Zealand	20	3,650	4,055
Italy	13	3,270	5,520



(Dr. Kasumi Yasukawa, AIST)

3. Science Diplomacy and the *East Asia Science and Innovation Area*

SCIENCE DIPLOMACY

1. Science in Diplomacy -> no proper channel to directly inform the political leaders with any scientific advice (Chief Science Advisor)
2. Diplomacy for Science -> the lack of political support in leading the numerous international organizations from Earth Observation to infectious disease
3. Science for Diplomacy (Science Diplomacy) -> using our development aid to support research collaboration with the developing world,

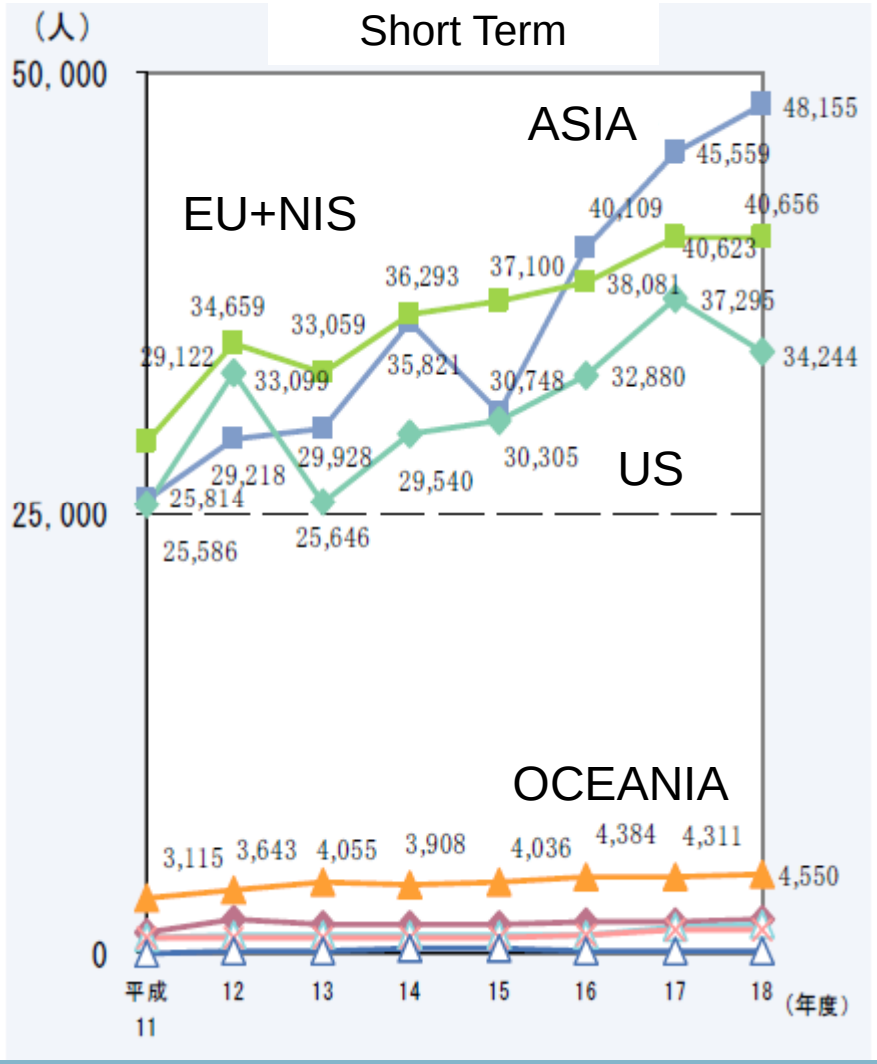
- Since the Soviet-Japan S&T Cooperation Agreement in 1973, Japan has signed the bilateral agreements with 42 countries and regions (28 agreements)
- *East Asia Science and Innovation Area Initiative*

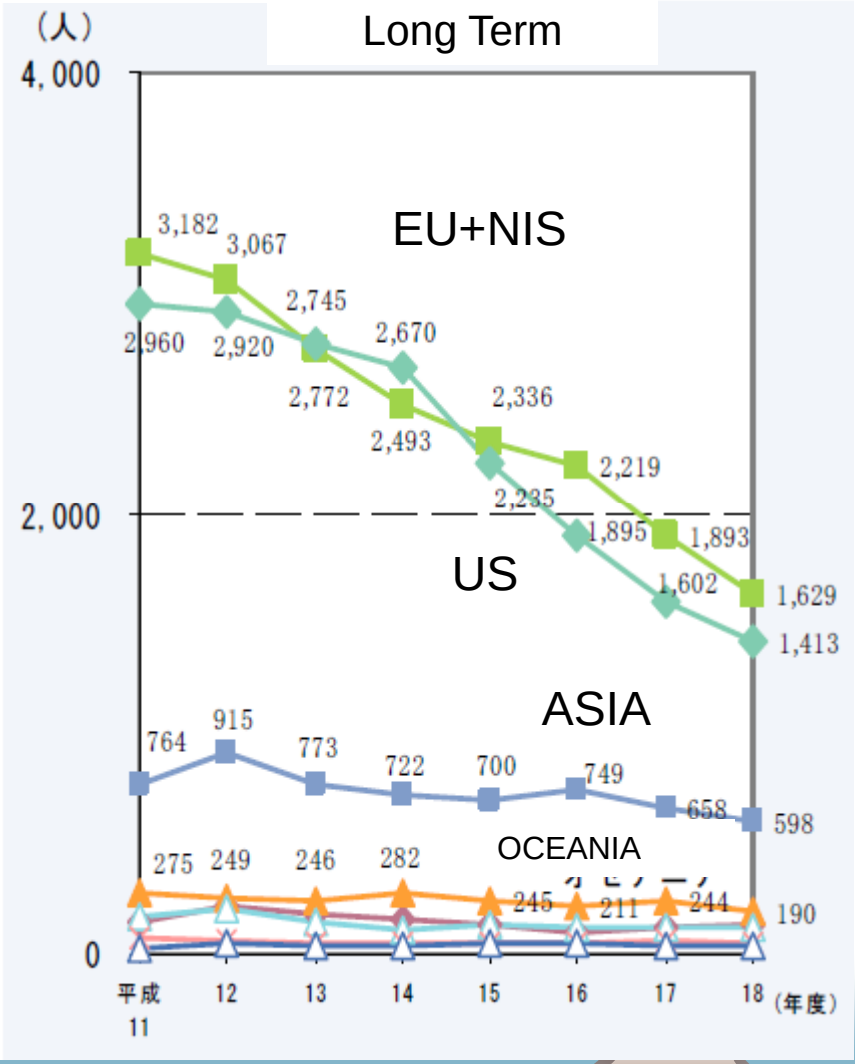
"East Asia Science and Innovation Area"

- Improve R&D and innovation capacity in Asia by accelerating flows of resources necessary for research
- Solve common problems in Asia by conducting collaborative R&D by "knowledge sharing"

1. Promote cross-border flows of resources to support R&D system in Asia – Student Exchange Programs, Scholarship to study abroad, Campus Asia, Funding for collaborative research
2. Creating a network of COEs throughout the region with common programs – J-GRID (infectious disease) , disaster prevention
3. Open Access Database – Asia Science and Technology Portal Site to help knowledge sharing

Total # of Researchers moving Abroad, Short term and Long term





（MEXT）

Knowledge Creation Strategy

- Reforming University System – Changing Academic Calendar to attract Foreign Students
- Reforming the National Research Institutions
- Globalizing the Education System - Campus Asia Initiative
- Okinawa Science and Technology University

Nature, Commentary, “No Time for nationalism” (2009/2)

its commitment to receiving advice from the National Academy of Sciences. But in the wake of this vague failure ran numerous successes.

Chief among these was the Tennessee Valley Authority (TVA), charged to develop the chronically impoverished and acutely over-farmed Tennessee River watershed. Best known for its hydroelectric dams, the TVA also employed scientists to improve the well-being of the Old South. For Harcourt Morgan, the agricultural scientist who became TVA chairman, a given innovation had not only to yield near-term economic efficiency, but also to promote sustainable use of resources.

TVA scientists ran experimental farm stations to cultivate crops chosen to prevent soil erosion. They reforested thousands of acres and resettled the region with deer. They reported on water quality, to shame polluters, and controlled water-borne diseases. The TVA built on the federal government's long-standing research programmes in the US Department of Agriculture, but it lent a newly coherent vision to the role of agricultural research in preserving American resources, and implemented innovative techniques accordingly.

In 1935, the new Works Progress Administration (WPA) brought these regional policies to the nation. Primarily meant to employ the jobless, the WPA funded laboratories at public universities and all kinds of basic research, as a quick look through scientific journals of the later 1930s reveals: studies of foraminifera, *Drosophila* and coliform bacteria; archaeology, geology and biology all enjoyed WPA assistance, which ranged from funding to providing statistical analysis to simply supplying willing workers. The WPA also promoted conservation, where again scientists played a major part, as in the design and construction of the dunes to prevent the erosion of the North Carolina seashore at Cape Hatteras.

From 1934 the United States saw annual

Yet the overall successes were obvious and much copied. The TVA brought industry and modernity to the Old South, and the 1930s brought unparalleled technological progress to the nation, so that most industries saw improvements in productivity owing to technical innovations and their application. In the 1940s, the United States found leaders throughout the developing world eager to imitate New Deal programmes for the practical application of scientific progress.

If the current crisis is to yield similarly enviable models for scientifically driven economic advance, scientists with research experience and applicable ideas must speak out so the new administration can hear. ■

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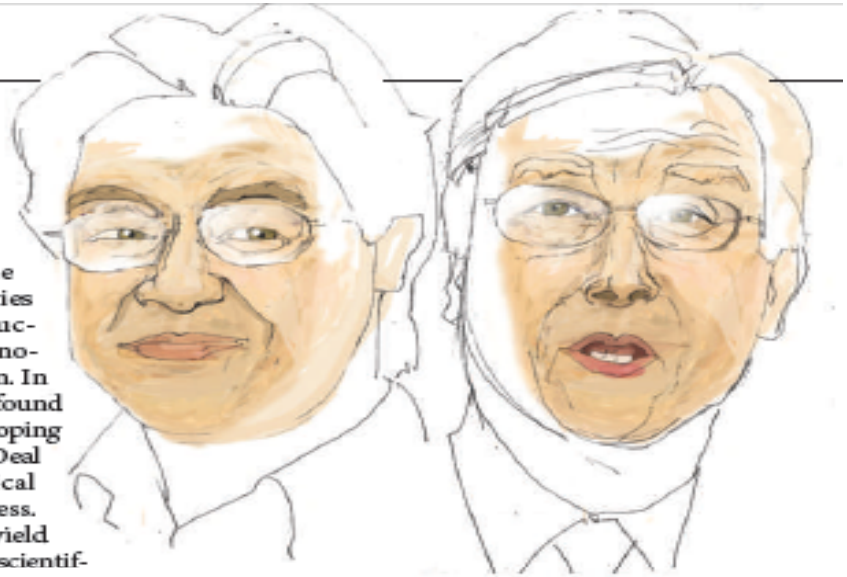

No time for nationalism

Basic research saw a boost in Japan's last recession. Better global links will help in the current one, say **Atsushi Sunami** and **Kiyoshi Kurokawa**.

plete halt, which lasted throughout the 1990s: a period often called the 'lost decade'.

Yet it was in the middle of this lost decade that Japan created the foundation of its current science and technology policy.

The extraordinary sense of crisis brought together the best of Japan's scientists with the policy community — for the first time since the period of reconstruction after the Second World War. It was apparent that, in line with the country's rapid economic development, the bulk of Japan's research and development was being done by industry, rather than within universities and public-research institutes, and the government was convinced this needed to change.

Blue-skies research was seen as the way forward: a shining light pointing the way out of a dark tunnel. So in 1995, the Science and Technology Basic Law was introduced, the first of its kind in Japan. With the establishment of a new Council of Science and Technology Policy, headed by the prime minister, science had finally stepped centre-stage in Japanese

Thank you for your attention.