

**Asian Science & Technology Forum**  
**“National Strategies to Foster Innovation in Japan”**  
**(Seminar Session XVII)**

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**Summary**

As Japan emerges from its “lost decade” of the 1990s, its leaders have come to recognize that innovation will be critical to the country’s economic and social well-being. Prime Minister Koizumi took office in 2001 faced with recession, an ageing population, and growing competition from China and other cheap Asian manufacturers. While his economic restructuring has displaced many traditional workers and ways of work, Koizumi has also emphasized policies that could potentially revitalize Japanese science and technology infrastructure and the workplace. His goal, he says is to turn Japan into “a nation built on intellectual property”<sup>1</sup> and an “innovation nation.” The speakers in this program demonstrate the legal and administrative changes and funding encouraged by the Koizumi Administration to advance these goals.

**Dr. William Blanpied**, former National Science Foundation attaché in Tokyo examined the history of Japan’s three S&T Basic Plans since 1995. Much of the restructuring of Japanese S&T institutions came alongside those for the central government in general. In January 2001, the Cabinet Office was established with the Prime Minister strengthen the functioning of the Cabinet. The coordination of S&T policy was placed in the Cabinet office with the National Council on Science and Technology Policy (CSTP). In addition, the Ministry of International Trade and Industry (MITI) became the Ministry of Economy, Trade, and Industry (METI), the Ministry of Education, Science, Sports and Culture (*Monbusho*) and the Science and Technology Agency of Japan (STA) were merged to form *Monbukagakusho* or, in English, the Ministry of Education, Culture, Sports, Science and Technology (MEXT). A number of laboratories, research centers, and associations loosened their ties to the government to become Independent Administrative Institutions. In April 2004, Japan’s national universities attained a status somewhat analogous to the independent administrative agency status that was granted to national laboratories three years earlier.

Prior to these reforms, the Diet in 1995 passed the 1995 Science and Technology Basic Law authorizing for 1996 the First S&T Basic Plan with the goal of doubling government S&T spending by 2000.<sup>2</sup> The subsequent two Plans were written by the CSTP, which established itself as the principal head of all science and technology policy in Japan. The Second Basic Plan was released in April 2001, soon after the CSTP was organized and the Third Basic Plan initiated in 2006. Other critical changes to reforms were a 1998 law in creating Technology Licensing Organizations (TLOs) that facilitate the licensing of intellectual property of university and

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<sup>1</sup> *Intellectual Property Policy Outline*, July 3, 2002, Strategic Council on Intellectual Property, Office of the Prime Minister of Japan, [http://www.kantei.go.jp/foreign/policy/titeki/kettei/020703taikou\\_e.html#0-2](http://www.kantei.go.jp/foreign/policy/titeki/kettei/020703taikou_e.html#0-2)

<sup>2</sup> You can find the texts of the Basic Plans at, <http://www8.cao.go.jp/cstp/english/basic/index.html#third>

government laboratory researchers to industrial organizations. In 2000, “Japanese Bayh-Dole Act” granted intellectual property rights to university and government researchers.

The First Basic Plan included provisions to improve research infrastructure, spend 17.6 trillion yen for research over a five-year period, and promote public understanding of science. The Second Basic Plan, under the guidance of the CSTP, emphasized reorientation of the research system by building a more competitive research environment, enhancing the independence and mobility of young researchers, and promoting cooperation among the academic, industrial and government research sectors. The Japanese government spent 21.65 trillion yen during the five-year period of the Second Plan, comparable to what the U.S. government now spends on R&D. The more significant achievements in the First and Second Plans include increasing the competitiveness of the overall research system, creating better technology transfer among academic, industrial, and government research facilities, and establishing an effective and fair research evaluation system. The least impressive achievement is the increase of mobility among young researchers, as they face a structurally flawed *koza* structure of seniority in the higher educational system.

The Third Basic Plan focuses on further reform of the research system, similar to what was initiated in the Second Basic Plan, with additional emphasis on creative and mobile young researchers. It also includes plans to increase the S&T workforce to include more female and foreign researchers. It specifies goals to improve international cooperation for S&T and economic relations. Finally, the plan asserts that CSTP has primacy over government and some non-government S&T systems in Japan. This primacy is limited, however, as many of the research facilities and national universities became independent with government reforms.

In conclusion, Japanese S&T advances over the next five years should be very impressive, like the last ten years have been. Progress we should watch for includes further models of technology transfer, efficacy of S&T evaluation, the outcome of government laboratories and national universities as autonomous organizations, effectiveness of the CSTP and other government ministries overseeing these autonomous organizations, and the desirability to evaluate the achievements and shortcomings of how the plan is working.

**Dr. David Kahaner** of the Asian Technology Information Program (ATIP) discussed how the underlying principles for S&T development in Japan are quite different from those in the United States. Rather than driven by security and defense needs, Japanese R&D is driven by commercial and societal needs. Additionally, Japanese R&D is at world-class level in many sectors, albeit rapidly dispersed into useful products and services. One critical observation is that Japanese society is often eager and welcoming to new hi-tech products and services. These attitudes help diffuse emerging technologies into the public and accelerate the process of advancing to the next generation.

Areas of Japan’s technology excellence: transportation, microelectronics, wireless applications, human interfaces and robotics, fuel cells, advanced computers, RFID applications, safety structures for homes, and medical technologies. Japan is the world leader in injecting technology into instrumented transportation allowing for the smooth movement of high numbers of people between transportation platforms. This includes infrastructure for trains, buses, roads, vehicle

information and communications, and advanced electronic toll and highway systems. The system is so integrated that not only do subways and buses post and keep to their schedules, but you can also get Internet delivery of real-time schedule information straight to your cell phone or laptop.

Microelectronics is also a large industry in Japan with Japanese companies involved in nearly all aspects of semiconductor manufacturing. They also are moving toward more advanced materials in microchip production. Sensor and mobile technology products and services are available to real people, not just professionals. For example, the Japanese have many personal use medical technologies such as blood pressure sensors, calorie meters, and circulatory monitors. They also have many mobile devices, such as cell phones, that are equipped with GPS, OCR, rail cards and even television. Features such as these will not be seen for at least two to three years in the U.S.

Human interfaces are also very impressive in Japan. Ticket machines, iconic displays, virtual trainers, ATMs, and even elevators have remarkable features that do their job very efficiently and conveniently. For example, ATMs can automatically update your bankbook without you having to write anything on your own. Robotics is applied to everyday purposes, not just manufacturing. One illustration is a robot that can help to monitor school hallways, assist the elderly, or even provide security for a building.

In energy production, Japan is a world leader in developing alternate sources. For example, Toyota, Honda, and Nissan sponsor large car fuel cell programs. Micropower generators are often in use to power small portable electronics. Another energy source includes photovoltaic (solar) panels, of which Japan is a world leader in production.

Advanced computers under development in Japan are used for social applications such as modeling the climate and weather or as earth simulators. The Japanese are working on a project to build a very large supercomputer called *Kei-Soku*, costing roughly \$1.1 billion dollars, and will be available by 2011. Another example of Japanese technology leadership is in nanotechnology: carbon nanotubes and nanosheets were invented in Japan, and they are searching for their social applications. Also, RFID is being used for non-logistics applications, such as tracking Japanese children by their backpacks and using RFID for readers in vending machines.

**Ms. Pamela Bates** of the State Department reviewed a near-60 year record of S&T governmental cooperation between U.S. and Japan. She works in the State Department's Office of Science and Technology Cooperation, Bureau of Oceans and International Environmental and Science Affairs (OES/STC) under the Under Secretary of State for Democracy & Global Affairs. She helps coordinate the international S&T activities of other government offices such as HHS, NSF, EPA, National Parks Services, and USGS. The OES/STC does not ever specify exact activities, but rather facilitates research centers to be accessible for all types of projects and S&T programs. Policy for these projects often comes from the grassroots; the OES/STC provides guidance and objectives but the programs are determined by the individual domestic and overseas agencies. Her office also staffs S&T experts and officials for these projects.

The first U.S.-Japan cooperative program was in 1947 with the Japan National Institute of Health and the Atomic Bomb Casualty Commission. It continues today and has tracked the health of thousands of individuals exposed to radiation from Hiroshima and Nagasaki. It established the official levels of radiation that are applied internationally. Other programs between the U.S. and Japan include those for conservation of marine resources, fighting emerging infectious diseases (focusing on Southeast Asia), and cooperation in physics and fusion R&D.

The key accord that defines today's U.S.-Japan civilian governmental S&T relationship is the 1988 U.S.-Japan Science and Technology Cooperation Agreement, which is still in effect today. Committees were formed when this agreement was made in order to ensure that both parties would obtain fair and equal benefits. Initial issues were access to technical documents, scientific meetings, and intellectual property protection. Today, most of these issues have resolved themselves and neither committee has met for a few years. Numerous specific MOUs for research cooperation have been signed between U.S. agencies and Japanese ministries, and these agreements are still active.

The U.S. and Japan work on climate change programs through multiple smaller programs to reduce emissions as well as advancing methane recovery in order to use it as a clean energy source. Health initiatives include cooperative medical R&D programs and projects to aid developing countries fight various diseases. Japan is key to various earth observation programs that help to improve management of marine and coastal resources. There are also extensive bilateral cooperation in basic science and math programs. Energy programs have become increasingly significant, and now energy cooperation such as fusion energy science and high energy and nuclear physics, which were not originally incorporated in 1988 S&T Agreement, will soon be added. Japan has announced that it is interested in the new Global Nuclear Energy Partnership initiative.<sup>3</sup>

**Mr. Robin “Sak” Sakoda** of Armitage International, an expert on Japanese security issues who held high level positions in the Defense and State Department, discussed the importance of greater security collaboration between the U.S. and Japan. Although there have been significant advances since 1995 in both thinking and actual security cooperation, there remains important legal constraints on a robust alliance. The most important one is Japan's constitutional prohibition against “collective” self-defense or joining other militaries for combat. Article 9 of the Constitution says the

*Japanese people forever renounce war as a sovereign right of the nation and the threat or use of force as means of settling international disputes. In order to accomplish the aim of the preceding paragraph, land, sea, and air forces, as well as other war potential, will never be maintained. The right of belligerency of the state will not be recognized.*

Currently, efforts to satisfy both Japan's constitutional issue and security needs lie in strengthening various programs and agreements.

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<sup>3</sup> See: <http://www.gnep.energy.gov/>

In regard to S&T cooperation, Tokyo has interpreted its Constitution as prohibiting military exports, which covered not only equipment but military technology as well. Pressures starting in the late 1970s to encourage Japan to shoulder more of the responsibilities and costs of its own defense resulted in efforts in 1981 for Japan to find some way to allow the export of dual-use technologies to the U.S. At this point defense technology became a central element in the Reagan Administration's "burden-sharing" approach to security relations with Japan. The Administration encouraged Japan to improve its defense capabilities and cooperate more effectively with the U.S. in meeting common security concerns.

The result has been a slow progression of Japanese involvement in R&D programs and alliance development. Japan began ballistic missile defense dialogue with the United States in 1987 when the two countries signed an *Agreement Concerning Japanese Participation in Research for the Strategic Defense Initiative* and started joint development of a fighter aircraft. Since the 1970s, Japan issued three National Defense Program Outlines (NPDO: 1976, 1995, and 2005). These documents have provided guidance for defense strategy, budgeting, and emerging security concerns. The 1995 NPDO widened Japan's security capacities to include relief aid, infrastructure development, and regional security concerns.

Seminal was the 1996 *Japan-US Joint Declaration on Security Alliance for the 21st Century* that emphasized the promotion of democracy and freedom while helping the U.S. maintain a stabilizing influence in the Asia-Pacific region. It provided a post-Cold War framework for U.S. Japan cooperation. The Bush Administration built upon this set of guidelines with concept paper by Richard Armitage, *The United States and Japan: Advancing Toward a Mature Partnership* (Armitage Report)<sup>4</sup>, who would become the Under Secretary of State. His study group advocated a closer U.S.-Japan security relationship that would mean revising Japan's Constitution and draw Tokyo closer to Washington's foreign policy goals. The result is the recent (February 19, 2005) *Joint Statement of the U.S.-Japan Security Consultative Committee*<sup>5</sup>, in which Japan agrees to U.S. force realignment, greater interoperability among forces, and expanded regional participation.

Today, the United States and Japan express their long security relationship as an alliance. Japanese troops are in Iraq and efforts are underway to revise Japan's export control rules and ability to operate jointly with the U.S. military. Mr. Sakoda, however, believes that there needs to be a more comprehensive agreement. Not just an agreement for security purposes, but one that draws in multiple departments and ministries in the U.S. and Japanese governments to mesh the two country's regulatory frameworks to better deal with the complexity and technologies of modern warfare. The U.S. is limited if it only looks at the defense aspects of the security relationship. Japan is the U.S.'s key ally in Asia, and the U.S. needs to facilitate better all elements of R&D cooperation.

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<sup>4</sup> *The United States and Japan: Advancing Toward a Mature Partnership* (Armitage Report), October 2000, [http://www.ndu.edu/inss/strforum/SR\\_01/SR\\_Japan.htm](http://www.ndu.edu/inss/strforum/SR_01/SR_Japan.htm)

<sup>5</sup> *Joint Statement of the U.S.-Japan Security Consultative Committee*, February 19, 2005 <http://www.state.gov/r/pa/prs/ps/2005/42490.htm>

In all, history, culture, and postwar tradition have made Japan a technological giant wary of widening its security responsibilities and obligations. Pursuing R&D cooperation with Japan is a necessary challenge for the United States.

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