Presentation by Iwao Matsuda
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Innovator Japan
Japan’s new science and technology strategy

My name is Iwao Matsuda, and I am Japan's Minister of State for Science and Technology Policy. Thank you very much for giving me this opportunity to talk at WSPA. It is a great honor to me. I would like to talk to you today about the policies for which I am responsible. At the end of March this year, the Japanese government made the Third Science and Technology Basic Plan. This sets the course for science and technology policy over the next five years. I directed its formulation, and it is closely related to the subject of my talk today.

You might ask why Japan needs to devote so much of its energy and resources to science and technology. Japan has its own reasons for valuing science and technology.

Japan imports nearly 90% of its oil from the Middle East. We are heavily dependent on other countries for resources and energy. There is no other comparable country with such an urgent need to pursue technologies for new energy to replace oil. Another unique reason is that Japan's population is more rapidly aging than any other advanced countries. Since last year, Japan’s population began to shrink. Japan is therefore especially sensitive to the need to improve economic productivity through the development of new technologies. Japan also possesses advanced science and technology. By using these technologies, we want to contribute more towards the resolution of global warming, the food problem, and other global issues.

Let me state a little bit about the international situation. I do not regard science and technology just as a matter of competition between nations. The creation of sophisticated science and technology in Japan is not only a contribution to the world community but obligation for us. However, the aspect of international competition is also a reality. The competition in Asia grows yet more intense. More than ever before, Japan needs to create its own original science and technology and

aim to become a world-class innovator. Otherwise, in 20 or 30 years time we will find it hard to maintain our present economic status in the world. All of these are the pressing reasons for taking science and technology very seriously in Japan.

(The Basis for Japan's Science and Technology Policy)

First of all, I would like to tell you about some of the basics underlying Japan's science and technology policy.

- The Science and Technology Basic Law was enacted in 1995.
- The Basic Law requires the Japanese government to make a Science and Technology Basic Plan.
- Under this Basic Law, the Japanese government created the First Plan, which covered from 1996 to 2000, and the Second Plan, from 2001 to 2005. Now we have the Third Plan, which started its five-year term in April of this year.
- There is one more factor in Japan's science and technology policy: the existence of the Council for Science and Technology Policy. The Japanese government underwent a major reorganization in January 2001. In this reform, Council for Science and Technology Policy, or CSTP, was created to serve as the headquarters for science and technology policy.
- The CSTP is chaired by the Prime Minister. As the Minister of State for Science and Technology Policy, I am in charge of setting the agenda, expediting the proceedings, and so on. The Council members include other Cabinet members who head ministries with science and technology budgets. There are also eight members from the private sector. They are experts who are leading figures at universities or the heads of corporations. With this membership, the CSTP determines the course of Japan's science and technology policy. The Council convenes every month at the Prime Minister's Office.

I want to mention another important thing about Japan's science and technology policy. We are currently facing severe fiscal conditions, but despite this the entire Japanese government is commited to strengthen our science and technology.

What I am showing here is a quote from Prime Minister Junichiro Koizumi. This is

from the general policy speech he gave to the Diet near the beginning of this year.

> The Prime Minister said: “Without the promotion of science and technology, the nation will not develop. With the aim of making Japan a "nation built on scientific and technological creativity," the Government will make its third-term basic plan for science and technology and will strategically prioritize support for research and development by increasing the budget for science and technology against the backdrop of a decrease in overall national expenditure.”

All this will give you a sense of how deeply the Japanese government commits to the science and technology policy.

(The Progress of Policy Under the First and Second Plans)

Let us briefly review the progress of science and technology policy over the past decade. The total government expenditure during the First plan was 17 trillion yen, and during the Second plan it was 21trillion yen.

Japan has been experiencing continuous, prolonged economic stagnation until recently. It is noteworthy that even in these circumstances the government has set clearly defined targets for investment in research and development. I think it is worth emphasizing that science and technology budget has been growing at a faster rate than other budget items.

The point is not, of course, just to increase the budget. The past two Science and Technology Basic Plans mapped out targeted measures that met the policy needs of those particular times and thereby aimed to realize the maximum impact. The First Plan, for example, placed particular emphasis on upgrading support for post-doctoral fellows. This policy increased the young and mid level researchers who will be conducting advanced research and contributed to raising the level of research in Japan.

There were two main pillars of policy in the Second Plan; namely one is setting strategic priorities for investment, and the other is reforming science and technology systems. In setting strategic priorities we categorized government R&D

investment into eight areas. Four of these areas were then identified to be given priority. They were life sciences, information and communication technology, environmental sciences, and nanotechnology and materials.
The second pillar, reform of science and technology systems involved setting of the target of doubling our competitive research funding. As a result, this funding was increased to a significant extent and has contributed to making the research environment more competitive.
These policy efforts made during the First and Second Plans have steadily raised the level of research. Japan's world ranking in research publications has risen in terms of both quality and quantity. Some of our research is producing results that lead the world.
These results in fact have led to the formation of large new markets. They are significantly leading the recovery of the Japanese economy recently.

(Issues Leading into the Third Basic Plan)
Now I would like to talk to you about issues leading to the Third Plan.
At the beginning of this talk, I touched on the question of why Japan treats science and technology as a crucial issue for supporting the country. Under current circumstances, those issues will be of even greater urgency over the next 5 years. The shrinking and aging of the population will no doubt accelerate gradually in the coming years. It is essential for productivity to continually increase. The countries of the West are tending to invest more of their energy and resources in science and technology, as well. On top of that, the rapid growth of technological capabilities in other Asian countries means that increasingly severe competition is also likely to continue with them. The most urgent issue we have for the coming five years is to accelerate economic growth by further expanding our science and technology efforts and channeling their fruits into unceasing innovation. Japan has now become one of the world's key players in science and technology. Reinforcing our contribution to the world in areas such as environment, energy, food and other global issues through science and technology has become a national mission.
Although none of these problems can be resolved easily, we must find a way through them to the future. The Third Basic Plan must address problems of this

nature.

(Basic Ideas of the Science and Technology Plan)

First of all, in order to engage with problems like these, our basic policy stance must include two key points.

The first point is, "science and technology should be supported by the public and also should return benefits to society." science and technology policy can not be implemented unless people understand and support it. We should strengthen the efforts to return benefits from science and technology to society and nation through innovation. We should also provide clearer explanations of science and technology policy and its benefits, and reinforce our accountability. This approach is crucial to the Third Plan period.

The second point is, "Fostering human resources and creating competitive environment." Japanese organizational management thinking tends to work against fostering innovative minds of researchers. The researchers should be encouraged to think creatively by competing with each other. That is how to make them develop their abilities fully.

(Clarification of Policy Goals)

One important feature of the Third Plan is how it defines the goals of science and technology in specific, accessible terms. Six policy goals are defined as major goals, and 12 more as intermediate goals.

The CSTP is going to seek the realization of these policy goals by urging government ministries and research institutions, to engage in R&D and achieve the results accordingly. We are also going to verify and communicate the progress achieved in approaching the policy goals. In this way, we will reinforce the accountability of science and technology activities to the public.

【↓Slide 6】

(The Total Amount of Science and Technology Investment)

Japan has recently faced fiscal conditions that are among the severest in the advanced countries. We cannot, however, neglect the significance of science and technology, of course. They are our "investment into the future." Despite the prolonged economic downturn of the past ten years, the Japanese government has spent more on R&D investment than on any other policy area.
The Third Plan will maintain this approach. During the five-year period from fiscal 2006 to 2010, the plan expressly calls for government R&D investment to the tune of approximately 25 trillion yen. This is something that the Minister of Finance and I discussed and agreed upon during the Japanese government's final budget talks at the end of last year. On the one hand we have severe fiscal conditions, and on the other the figure of 25 trillion yen. This situation embodies the expectations of the Japanese people, and we must respond accordingly.

(Setting Strategic Priorities in Science and Technology)
The question, then, is how to make the most effective use of this precious science and technology investment. This calls for an investment strategy that has a clear sense of what lies ahead for Japan.
The Third Plan has defined two main pillars of government science and technology investment. These are basic research and policy mission-oriented research and development.
Basic research consists of steady, earnest effort to inquire into the truth, combined with the accumulation of trial and error. The keyword for resource allocation, therefore, is diversity. We made the decision to sustain a steady support for basic research at a certain level of funding while taking care to bear diversity in mind.
On the other hand, for policy mission-oriented R&D, we set priorities with a focus on the realization of policy goals.
For the Third Plan, therefore, life sciences, information and communication technology, environmental sciences, and nanotechnology and material have been designated as the "four priority promotion areas". Energy, manufacturing technology, social infrastructure, and frontier sciences were designated as the "four promotion areas." The former are being assigned priority for the allocation of

resources.

(Setting Further Priorities)
During the period of the Third Plan, we also applied the principle of selection and concentration thoroughly within each of the four priority promotion areas and the four promotion areas. We determined which research subjects in each area should receive concentrated investment by specifying the "strategic science and technology priorities".
After a process involving many experts, 273 research subjects have been chosen at first. From among them, 62 “strategic science and technology priorities” were chosen. This is the first time that such a clearly defined investment strategy has been introduced in the history of Japanese science and technology policy.
I hope very much that setting priorities in this way should lead to more effective R&D investment and help achieve the policy goals that we set.

(Examples of Science and Technology for Strategic Prioritization)
Here we see some examples of strategic science and technology priorities. In the life sciences, for instance, there is translational research for practical application of research results in the diagnosis and treatment of lifestyle-related diseases. There are the world's fastest super-computer, global environment observation technology that is leading the world, medical technology for the early detection of microscopic cancers and delivery of drugs at the cellular level. There is development of technology for next-generation automobiles that do not use petroleum. There is search technology for use at disaster sites in order to reduce human damage as much as possible. We chose these and other such science and technology projects that meet life needs felt acutely by the people, and that have the potential to overcome increasingly intense international competition.

(Reform of Human Resource Development Systems)

The Third Plan presents the reform of Japan's science and technology systems by various different approaches. Their substance is shown here.
The Third Plan emphasizes the importance of human resource development. Science and technology in Japan will depend on whether or not we can nurture motivated researchers who enthusiastically engage in intellectually creative activity. A research environment that allows people to engage in fresh, lively activity will be essential in developing those researchers. It is necessary, for example, to allow for the creation of mechanisms that will allow young researchers to launch their own research vigorously. Also, considering that Japan has the smallest proportion of female researchers among the advanced countries, we have set a numerical hiring target of 25% for natural science researchers. We want many top-quality researchers from other countries, and I intend to do everything possible to improve the environment for that purpose.

(The Creation of Innovation)
The Third Plan lays great emphasis on the ‘creation of innovation’. Innovation consists of new discoveries and inventions and their transformation to new social and economic values. It is truly the driving force for economic growth.
At the end of 2004, the Council on Competitiveness in the United States published the "Innovate America" report, also known as the Palmisano Report. Last year, another report “Rising Above the Gathering Storm” was released by the National Academy of Science and others. I understand these reports show that the United States intends to sustain its ceaseless effort to make progress, and not merely be satisfied with its position as world leader in science and technology. I was very impressed by this stance.
The policy goals set forth by Japan's Third Plan also include a reference to "Innovator Japan." This is a call for Japan to become one of the world's leading countries by means of its own innovation, a call for Japan to become a global innovator.
I have already mentioned how Japan is achieving higher levels of progress in science and technology each year. We have already seen a number of cases in

which high-quality research results achieved in Japan have led to innovations that have reached the world's markets.
Electrically conductive plastic is one example. The principle of this plastic was discovered by Professor Shirakawa, a Japanese Nobel Laureate. It is a key component in many different products today, including mobile phones, automated teller machine touch panels, and digital cameras. There is also the perpendicular magnetic recording method that was developed by a group of researchers at Tohoku University. This allowed a significant reduction in the size and increase in the capacity of hard disk drives. The resulting market is expected to expand to several trillion yen by the year 2010.

Japan has suffered from economic stagnation since the collapse of the bubble economy some time ago. The economy is now accelerating growth, with signs of vitality in domestic consumption. As The Economist magazine pointed out, "The Sun Also Rises." Japan has, at long last, entered the process of sustainable expansion.
Japan's manufacturing industry is making good use of the latest science and technology results to develop its own distinctive products. If we can accelerate this trend, then I believe that the day when Japan regains its leading position in the world economy will come soon.
What this means, therefore, is that the sole determining factor for the future growth of Japan's economy is innovation.

My question then, is what Japan should do right now to accelerate its innovation. As I told just before, there are excellent and original research and development results that can be seeds for innovations. However, in order to make innovations as a driving force of Japan’s economic growth, it is an urgent task for us to increase the seeds of innovation in a dramatic way.
In the Third Plan, we set it our target to establish 30 top world-level centers of excellence in research. Also under the Third Plan, with industry and university partnership, the program for building the innovation centers in the field of

advanced inter-disciplinary areas started this year.

To invent world-renown research or collaboration centers like these, requires structural reform of organizations creating an environment in which researchers can concentrate and work at their best. There is still considerable room for improvement in that regard.

I have heard that leading researchers in the United States can be paid salaries as high as 500,000 dollars or more. We need to transform our organizations so that we can make drastic shift over to a merit-based system. Then outstanding people can receive the pay and other treatment they deserve in Japan too. The key players in Japanese science and technology are the national universities. These have now been made into independent corporate entities, giving them greater freedom in management, and this represents an opportunity. The private-sector R&D system also needs to shift out of its traditional self-contained approach to human resources. Innovations will get activated by dynamic transformation of Japan's R&D system throughout both of the private and public sectors. .

The R&D budgeting system also lacks cohesion, being dispersed among ministries or funding agencies. There is a question, therefore, of whether we have the adequate arrangements for carefully selecting those programs that produce good results and to nurture them over the long term. This is another area that requires us to strengthen coordination drastically. Moreover, even when a research project yields excellent results, there is some hesitation in using the new product or service. No doubt there is ample room here for the government to perform a pump-priming role. We will promote such policies..

We can see many examples that good R&D results only yield domestic market and do not become international standards. We will change the situation and make every effort to initiate more international standards from Japan.

To activate innovation further, not only government procurement or international standardization, but also various regulations and social framework often hinder them. For example, to bring the research result from life sciences into the creation of new medicine, clinical trial system reform will contribute to the acceleration of innovation. Reforms in immigration control could contribute to invite foreign nationals as well.

Up to now, the CSTP has focused on the job of determining the most appropriate allocation of funding. Now, these institutional reforms are identified as our new critical task. We intend to coordinate to the fullest extent with the ministries concerned in order to fulfill our active commitment to this task.
Industry and academia will also have to institute thorough cooperation in research. They should also upgrade their collaboration across several areas of concern, including human resource development.
As we can see, there are various different policy issues involved in realizing "Innovator Japan." I think that the key issue for the CSTP, for the time being, will be to establish comprehensive innovation strategies without delay. In this way, I want science and technology in Japan to become like an abundant spring, from which our innovations will well up and finally become a huge river that flows out boundlessly to the economy and society of Japan, and to the world.

(Conclusion)
I would like to have one more word in closing. I have said so far that I intend to expedite reforms that will encourage innovation. If such reforms can be pushed forward, and if a thorough merit system can be put in place, then I have every expectation that leading researchers will make their way to Japan's research organizations from across the globe. And so I say, "Innovators of the world, come together to Japan!" As Minister of State for Science and Technology Policy, this is the main message I have today for my American audience.

Thank you very much.