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In the two months since returning from Japan, many people have been asking me what I learned about Japan while I was there.

As it turns out,
At least, I think this was true for me.
h/s
Assesses a person
Interestingly, there is something about living thousands of miles from home that ~~causes you~~ to think more clearly about ~~your~~ own country. Thus, while overseas, I had a great opportunity to learn not only about Japan. I learned some important lessons about America, too.

One of the most important of these lessons is that our two nations face many common challenges as we advance into the next century and millennium. A lot of these challenges come together in the field of science and technology — a field which I am convinced holds the key to the future prosperity and well-being of the world's population.

I don't wish to stand here this evening and offer myself as an expert on science and technology. After all, I can hardly get my own VCR to work!

But my past three and half years across the Pacific Ocean gave me a front-row seat on some emerging trends in the global economy — especially in the area of science and technology. Indeed, the question of America's technological leadership was a subject of considerable discussion at the Embassy in Tokyo as we reviewed the different strategies of the United States and Japan ~~on science and technology.~~

This is pretty important, considering that, together, the United States and Japan account for almost two-thirds of all ~~research and development~~ spending in the world. *S & T*

This evening, I would like to share a few thoughts about the direction in which I see Japanese science and technology going — and contrast this with what I see happening in America. Then I will be pleased to answer your questions.

Japan's economic system is under severe pressure right now — with five years of sluggish growth, an ocean of bad debts, a sinking stock market, and growing frustration with an over-regulated economy. As a result, many Japanese voices are now calling for reform to make their system more open.

Given the bad economic news coming out of Japan, it might be tempting for Americans to dismiss Japan as no longer a serious economic rival. But Japan has enjoyed astonishing economic growth over the past several decades — emerging from the devastation of war to become the world's second largest economy.

For all of Japan's current problems, she is neither down nor out. ~~Despite the crash of both the real estate and stock markets,~~ Many Japanese companies — especially exporters like Sony, Toyota, and Canon — are prospering. While the projections on economic growth this year remain pessimistic, the return of the very cheap yen will almost certainly mean rising exports and declining imports for Japan — ~~meaning a larger trade imbalance once again with the U.S.~~

It would be a great mistake for us to underestimate the resilience of Japan's economy. One major reason is that Japan has embarked on a very ambitious national strategy to expand her science and technology capabilities as a means of renewing her economy.

As you know, the United States is generally considered a world leader in basic research and development, while Japan is seen as particularly adept at commercializing technologies. America is ^{often} described as a "technology pioneer" — talented at inventing and innovating — while Japan is a "technology follower" — skilled at borrowing and perfecting what's already been invented.

This may well have been true in the past. But today's reality is different — and there may be even more changes to come.

Japan's political, bureaucratic, corporate, and educational leadership ^{have} ~~has~~ reached a consensus that their country "must stop being a nation of technology followers and become a nation of technology innovators." As they see it, their nation's future economic well-being is at stake.

This is a very important decision for Japan, one that was reached only after much deliberation and consensus-building among the key sectors of society. It is often observed that ^{society} ~~the~~ tradition-bound culture of Japan does not ^{change with the same speed or flexibility} ~~have~~ same quick-change capabilities as America. It's probably true that the Japanese system can't turn on a dime. But once the Japanese do decide to turn, they know exactly in what direction they're going and then move ahead with ^{such determination} ~~determination~~.

Money is usually a pretty good indicator of ^{such determination} ~~how serious~~ a new project is. Last summer, the Japanese cabinet approved a proposal to spend 155 billion dollars — yes, that's billion — on government science and technology programs over the next five years.

This

As someone once said: A billion here . . . a billion there . . . and pretty soon, we're talking real money! ~~It turns out that the~~ projected increase in Japan's R&D spending is only a little bit less than the total of what our government is projected to spend on civilian R&D during the next five years.

This comparative pattern is not entirely new. As a percentage of gross domestic product, Japan's R&D spending has exceeded ours since the 1980s. With this new science initiative, Japanese government spending on civilian R&D will soon exceed, in absolute terms, U.S. government spending on both military and civilian R&D. This ~~change~~^{fact} is especially dramatic when you consider that we have twice the population of Japan — and our economy is almost two-thirds larger.

throughout modern ~~The Japanese~~^{is push} ~~push~~ to increase R&D spending to match — and exceed — our ~~levels~~ fits into the theme of "catching up with the West," which is ~~very resonant in a~~ Japanese history ~~and culture~~. Interestingly, Japanese officials almost always use ~~comparative statistics that include military R&D. Japan already outspends all other countries in civilian R&D as a percentage of GDP.~~ "technationalism"

Ninety-five percent of the Japanese government's R&D budget is dedicated to civilian technologies. The Japanese government is focusing its new strategy on basic and applied R&D for commercial applications. With product life cycles getting shorter, Japan believes it can no longer depend on its traditional strategy as a "technology follower" to stay competitive. Instead, it must improve its own capability to conduct innovative research by transforming itself into a technology pioneer.

that is where we join
The Japanese government has decided ~~that~~ because R&D breakthroughs often occur at the level of basic research, it must become a world leader in this area. ~~The programs targeted for the largest budget increases are those designed either to improve Japan's basic research infrastructure or to develop "frontier technologies" which Japan believes are critical to its economic future.~~ *targeted at programs*

Japan's technology strategy includes four major elements:

- sustained increases in government funding for basic research;
 - education reform, especially of university education at the graduate level;
 - financial reform to expand venture capital; and
 - continued targeting of selected foreign technologies.
- e.g.,*

We have good reason to welcome Japan's new efforts in science and technology. We have long encouraged Japan to invest more in her scientific capabilities. This nation has much to offer the world — especially in areas like health, energy, the environment, and disaster prevention. As Japan's scientific capabilities increase, opportunities also increase for us to benefit from Japanese research — in much the same way that Japan has gained from our scientific and technological progress.

also reasons for us to worry
There are ~~some troubling trends, however.~~ *reason concerns* One is ~~with~~ intellectual property protection.

Just as the global regime of free trade depends on all nations opening their markets to fair competition, a global system of scientific and technological progress requires that all nations ~~participate in a fair system~~ *abide by fair rules* of intellectual property protection.

Increasingly, as you well know, the most valuable resource of many companies is knowledge and ideas — especially as they are embodied in technology. For America to stay ahead in the high technology race, our companies need to be able to protect their intellectual property. Unfortunately, many nations have weak systems of protection. ~~There are often complex differences between national systems that must be understood.~~ *analogy* I think we have all heard horror stories about what can happen — everything from sophisticated patent flooding to outright piracy.

The U.S. Patent Office recently issued its list of top ten patent recipients from last year. Number one on the list was IBM; number three was Motorola. The other eight were all Japanese corporations. This reflects the ~~dynamism~~ *analogy* of Japan's economy, their commitment to high technology, and their enormous cash reserves.

Our patent system is wide open and readily available to protect the legitimate commercial interests of any corporation, foreign or domestic. But American companies often don't enjoy the same protection in other countries.

In Japan, for example, foreign corporations often find it difficult to obtain patents; the patents that are granted tend to be very narrow; and there is often a lengthy delay in the processing of patent applications (though now there is the option of a 36-month accelerated process). We have asked Japan to change *to a more*

Emerging high-tech companies are among those most vulnerable to ~~these~~ *reciprocal arrangements* intellectual property problems. These companies have the ideas and the technology. They must work with ~~other~~ investors, partners, suppliers, ~~or~~ customers — who, in turn, are apt to become knowledgeable about the product — and perhaps assume they have a right to it.

The process of commercial technology development and transfer needs to proceed in a fair and honest way. Japanese firms are adept at acquiring our commercial technology, but we do not always enjoy a reciprocal ~~two-way~~ technology flow with Japan. One way to improve this situation is to foster a greater presence of our students, researchers and industries in Japan — so they can benefit from Japanese research progress.

As important as intellectual property protection is, it is not the most serious problem we face from Japan's technological challenge.

In fact, the most ^{alarming} ~~serious~~ threats are entirely of our own making.

While Japan is taking the necessary steps to address its relative weakness in basic research, the United States is on a path that will diminish our own lead in science and technology. The economic consequences are potentially ~~severe~~ ^{catastrophic}.

~~Among the most serious threats to American Science in America today faces a number of severe problems:~~
^{include:}

- a decrease in federal support for R&D, especially basic research,
- a deterioration in the quality of our K-12 education system,
- the growing unwillingness and inability of our government and corporations to invest in long-range research projects, and
- a declining interest by many of our brightest young people in pursuing scientific careers.

I am sure that you know better than I do the terrible consequences for our economy — and our society — if these trends are allowed to continue.

Without a doubt, our scientific and technological prowess, coupled with our open entrepreneurial system, continues to be America's greatest competitive advantage. To the extent we neglect science and technology, we allow the very ~~foundation~~ ^{basis} of our wealth to deteriorate.

A new analysis by the National Academy of Science [↙] finds that the overall federal science and technology budget — excluding the military — has fallen in real terms by five percent since 1994. If we exclude spending by the Institutes of Health, the decline is closer to 10 percent. That's in just a three-year period.

American
Almost by default, a larger percentage of total spending on R&D has been coming from private industry instead of the federal government. Twenty years ago, the federal government supported 50 percent of all R&D performed in the nation. Ten years ago, the figure was 45 percent. Today, it is less than 35 percent.

But, when adjusted for inflation, even private industry's overall R&D spending has been relatively flat in recent years.

And when it comes to basic research,
most profitable
not private
fully meet the need
out While basic research is where many of the greatest technological advances start, there are nonetheless real limits on how much we can expect corporations to invest. Basic research accounts for only about 16 percent of our nation's total R&D spending, private and public. But government funding is critical — picking up about two-thirds of the total bill for basic research. Half of this research is conducted at universities. The federal government is responsible for virtually all of the research support at universities.

e
Unfortunately, efforts to balance the budget and reduce the size of the federal government have created great uncertainty about the future of federal support for science and technology.

trying to get some attention for America's budgeting
Now, I fell on my political sword back in 1984 ~~because of our exploding budget deficit~~. But I fear that we have now made a political icon out of the balanced budget, even as the deficit ~~has shrunk~~ *is shrinking*. If Congress and the President insist on balancing the budget by 2002 while giving away 100 billion dollars in tax cuts, they may have to cut total spending on all discretionary programs by 30 to 40 percent. ~~Already, the current budget plans~~ *from* both from Congress and the White House — call for nonmilitary R&D to decline by nearly 25 percent in real terms by the year 2002.

As important as it is to get our fiscal house in order
This is like taking stones from the foundation of a house to repair the roof
It doesn't do much good to balance the budget while we let the foundations of our economy crumble. More fundamental — and urgent — than a balanced budget is the need to reorient our national priorities toward investment rather than consumption.

for example
After all, R&D spending represents an investment in the future, not a form of short-term consumption. ~~The university research system in America~~ *is* an economic engine for our entire country, creating new technologies that lead to new industries and good new jobs. Reduced funding for our research institutions undercuts our technological and economic leadership abroad and diminishes opportunities for Americans at home.

In the private sector, too, we must be careful not to squander our technological leadership. The Japanese are noted for their patience in long-term development of markets and technology. Unfortunately, our corporate practices often favor short-term financial gain — and we lose sight of the long road ahead.

So, as the Japanese prepare for a major expansion of their science and technology efforts, the United States is headed in the opposite direction. We are following this course not because of any deliberate decision or strategy, but as a byproduct of other policies *that give low priority to S & T* *thoughtful* *↑ simply*
~~Therefore,~~
Nonetheless, I think we should welcome Japan's new initiatives in science and technology. Perhaps their challenge will awaken us to our own responsibilities and inspire us make the commitments needed to maintain and advance our own technological strengths. I believe we can do it. We have a lot of things going for us in America. In many ways, we are uniquely positioned to meet — and thrive on — the challenges of this global economy.

In fact, in a recent New York Times column, Tom Friedman attributed ^{S/} much of the U.S. stock market's sustained rise to something he calls a "Globalization Premium":

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"If 100 years ago someone told you that by the end of this century the defining feature of world affairs would be 'globalization' — the integration of financial, information and trade networks to create a single, high-speed global marketplace — and that you had to design a country best suited to compete in such a world, in many respects you would have designed today's America."

"The U.S. has the world's most diverse and efficient capital markets, which reward, and even celebrate, risk-taking. Anyone with an invention and a garage can hope to raise millions overnight. It has a multicultural population that speaks the language of the Internet, a constantly renewing flow of immigrants, a transparent legal and regulatory environment and a flexible federal political system. It has a job market that enables workers to move easily from one hot industrial zone to another, and a corporate sector that has, unlike Europe's or Japan's, already gone through the downsizing and restructuring needed for global competitiveness."

There is, Friedman concludes, a sense among global investors that somehow the whole mix of America — our society, our culture, our technology, our business environment, even our geography — "meshes more naturally with globalization than either Europe or Japan." A sense that "while many in Europe and Japan are still trying to adjust to the demands of globalization, and are barely up to the starting line, the U.S. is already around the first turn."

I think Tom is right about this. But we still must guard against complacency — and I'm afraid science and technology is one area where we have indeed become complacent.

While Japan can learn many things from us, we can also learn many things from them. Make no mistake: Japan has learned ~~much~~ ^{and has} from our example in

already *a great deal*
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They see how important this has been to the productivity, energy of our nation.
science and technology. But when it comes to a focused commitment to strengthen science and technology for the future, I think ~~we~~ now ~~must~~ learn from ~~their~~ Japan's example.

it may be our turn to

establish a new budget category on federal S & T
that focused on activities that produce or expand the
use of new knowledge and new technologies

↓ false dichotomy
basic vs. applied
science

nature of
research -
outcomes can't
be predicted

cell phones
computers
medical lasers
disease-resistant crops
satellites
biotech
fiber-optic networks

S&T has enhanced natl security, improved human health,
produced a stronger economy and led to a cleaner
environment

The US has risen to its position of global leadership
in part thru our strength in S & T

research excellence
in infrastructure



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