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## The Importance of Innovation in the World Context

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What's going to be the capacity of our institutions to manage the potential for conflict and pressures for resources?

So innovation will be fundamental in dealing with these most fundamental problems we face.

Thanks.

DR. KING: Well, Dave, thank you for getting us off to a good start. You have laid out some of the issues that we are going to try to get at during the conference, and you certainly set the level for our conference.

It is now a pleasure to introduce my old friend Kent Hughes. He has appeared sometimes before at our programs, and it is always – he is always helpful in the structuring of the programs. So without further ado, the floor is yours, Kent.

#### UNITED STATES SPEAKER

*Kent T. Hughes<sup>†</sup>*

Thank you, Henry, very much.

It is a great pleasure to be here at the Institute again and always a pleasure to be involved in something that Henry has put together. He seems to have a knack for being on the cutting edge, and I think today's program is clear evidence of that.

The question of innovation, as David has clearly stated, is going to be one of the defining elements of the 21st century. David really focused on the good side of innovation, but we are also going to be dealing with the potential ill uses of innovation, the focus on weapons of mass destruction being one clear example.

I have to say that Henry was taking a considerable risk by inviting an economist to be on this panel as opposed to a well known and articulate journalist.

As you know, Washington, D.C., is, once again, taking its revenge on my profession by circulating a new definition of economists as a group of people

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who are fairly good at numbers but do not quite have the personality to be CPAs.

Worse, economists are known for their love of complexities, an approach that frustrated President Truman.

He was sick to death of people coming in and saying, "Well, Mr. President, on the one hand, interest rates may rise, but on the other hand, interest rates may fall." And finally Truman said, "I want some good one-handed economists."

I will try to make a few one-handed rather than off-handed remarks as we go forward. I must say that Henry should have warned me I would be on the same panel as David Crane, who has really just given a marvelous presentation. He covered much of the important ground, did it clearly, and in a way that left me with two pages of notes to think about when I get back to Washington.

I will be a bit briefer. I do not need to do anything more than amplify a couple of the themes that David struck and at the same time add a note or two of my own about where I think we are going.

The importance of innovation was one of the things that Henry asked us to talk about. David very nicely laid out some of the challenges we face in the future and how each one of those challenges had a significant innovation or technological dimension. We are not going to get where we want to on energy or deal with new diseases, or respond to a potential pandemic without thinking about a major technological dimension.

Different professions find their own way of emphasizing the centrality of innovation to modern economies. Economists often cite Nobel Prize Laureate, Robert Solow, who emphasized technology and innovation as key elements in economic growth.<sup>41</sup>

When you talk to engineers today, they often of have 'look-every-day-life test. You get up in the morning, and the automatic coffee maker is there for you. You click on the TV. You drive off to work with a computer controlled car. You have your lunch in the microwave. At work, you are often e-mailing the world. So much of what defines our day comes from the world of technology and innovation.

For doctors, of course, they point to the age of penicillin and the many miracle cures that have followed. In the United States, we may think a bit more about defense related technologies. Because of accidents of history, World War II, the Cold War, and the earlier British global role, the United States has acquired a global role in terms of security and defense.

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<sup>41</sup> Robert Solow, *Technical Change and the Aggregate Production Function*, 39 REV. ECON. & STAT. 312, 312-20 (1957).

If you talked either to generals or diplomats, they would be thinking of innovation and technology in the way in which it contributes to a strategic role for the country. And then the United States certainly has what I would like to call the American dreamers, people who saw innovation and technology as a way of making great leaps forward.

You think of President Kennedy and the trip to the moon; President Nixon and the war on cancer that David mentioned earlier; President Reagan's search for a ballistic missile defense was turning to technology as a way of moving away from the doctrine of mutually assured destruction.

Clinton saw technology as central to the economic future of the United States. In President George W. Bush's 2006 State of the Union Address, the President has laid out the American Competitiveness Initiative that emphasized research and education as central to the country's innovative future.

The United States and Canada and really much of the world face a new range of economic challenges. There are also political challenges, at least, in the United States we continue to hear a great deal about the effort to respond to Islamic extremism; other societies in Europe have been dealing with terrorism for quite a while.

We are all one plane ride away from any disease in the world. Just as we have gained from global communication networks, they have also facilitated global criminal networks. Communications has brought us much closer. We used to talk about a global village, now we can almost talk about a global neighborhood.

One hundred years ago, we would have read two or three months later what was happening on the other side of the world. Today, the news brings world tragedy into our homes as it happens.

In the United States, unlike Canada, which has gotten its fiscal house in order, we face some serious economic imbalances. Our big fiscal deficit coupled with a record current account deficit has the potential for disrupting our whole approach to innovation.

In the last three months of 2005, the United States ran a current account deficit of \$225 billion dollars.<sup>42</sup> At a yearly rate, that amounts to \$900 billion dollars; an unprecedented deficit. If the U.S. dollar did not still serve as the primary reserve currency for the world, we would have already seen, I think, drastic changes in the value of the dollar relative to other currencies.

The industrial world as a whole faces an enormous competitive challenge; since the fall of the Wall in Berlin, almost three billion people that have joined the global economy.<sup>43</sup>

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<sup>42</sup> *U.S. International Transactions: Fourth Quarter and Year 2005*, News Release, U.S. Dep't of Com., Bureau of Econ. Analysis, Wash., D.C., Mar. 14, 2006, available at <http://www.bea.gov/bea/newsrelarchive/2005/trans405.htm>.

<sup>43</sup> CLYDE PRESTOWITZ, *THREE BILLION NEW CAPITALISTS: THE GREAT SHIFT OF WEALTH*

And as David suggests, they all aspire to a developed country standard of living. Rural villages in China are getting satellite TV coverage of fashion shows in Singapore. Modern communications and ease of travel are raising expectations of a better life in virtually every corner of the world. As David mentioned, rising expectations create the potential for rising discontent. To raise global living standards would put enormous pressure on the world's energy and resource reserves.

As we work to raise, let's say, just to a 1950s United States and Canada level, the two or three billion people that live on less than \$2 a day, it will put enormous pressure on the climate, on energy supplies, on virtually everything.

The United States and the industrial world as a whole have faced competitive challenges in the past. In fact, the United States is thinking about the experience we had in the late 1970s and early 1980s when Germany and particularly Japan were a real challenge. In 1980, Silicon Valley leaders would come to Washington and say, "Our biggest problem is showing people around the Valley so they can really see how it is done."

Five years later you heard the same people say there are two kinds of companies in the United States: Those that are being beaten by the Japanese and those that are about to be. As a result of this challenge, public policy changed in many ways. There was a focus on enabling innovation, allowing business and universities, business and the national labs, and business with business to collaborate in a way that would foster more rapid innovation and more rapid commercialization of that innovation.

And out of that decade long effort there emerged a competitiveness strategy, creating the kind of environment that stimulates investment, public and private, and an emphasis on adding technology policy to our long-term growth strategy.

The Government was taking not only education and training, but realized that the U.S. economy is changing at such a pace that you had to think of lifelong learning.

President Clinton frequently reminded the American people that the old picture, the Leave-It-To-Beaver picture of 40 years with the company, the gold watch, and the golf course was over.<sup>44</sup> We were going to have several jobs in a lifetime, and we will have to keep our skills current. Finally, we continued to have that emphasis on international trade coupled with a strong export promotion policy.

In the 1970s and 1980s we tried to overcome the sterile debate that David mentioned, that small Government, the private sector, and markets do every-

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AND POWER TO THE EAST (Basic Books 2005).

<sup>44</sup> Clinton Says Education Key to Competition, ARK. DEMOCRAT-GAZETTE, May 21, 1987.

thing. In fact, we realized that we were developing a kind of partnership nation. There were often multi-party partnerships where a junior college may be working with a company and companies are working with national laboratories. State governments became active partners in fostering innovation in their own jurisdictions.

In the 1980s, we developed a potentially positive kind of competition among nations. In the period between the two world wars, nations competed by closing their markets and manipulating their exchange rates. It ended up being bad for the global economy. I think we have now moved into a world of nationopoly, not just oligopoly but nationopoly where we are looking at Canada to learn what they do well. In the 1980s, we looked at Germany and Japan, and we borrowed some of their public sector approaches.<sup>45</sup> Business looked around the world and learned from Toyota an organizational innovation, the so-called lean production technique.

Once again, the United States is beginning to focus on these questions that faded in the 1990s. By the end of that decade, everyone was talking about the so-called “Goldie Locks” economy,<sup>46</sup> where, like the baby bear’s porridge, everything was just right.

Unemployment reached a 30-year low. We had rapid growth, and rapid productivity growth.<sup>47</sup> We had five years where we really were meeting the test of shared prosperity. It was that rare rising tide that was, in fact, lifting all boats.

So water cooler conversation turned to who bought the latest initial public offering? Who was a day trader? Boy, there is somebody down the hall who made \$10,000 overnight and so forth. We took our collective eye off the innovation ball. Then, of course, 9/11 hit, and the whole country’s attention shifted towards national security and the new struggle against terrorism.

Now, there are a number of people that are alerting us to this rapidly changing world and people are beginning to listen. Just looking at the trade deficit and the current account deficit has begun to get people’s attention. I have a whole list of challenges but I am going to skip them in the interest of time so we can get to questions.

There was a recent article in *Fortune* that wrote about the tragedy of GM.<sup>48</sup> Here was this behemoth that in the early 1960s was scared to death that they would get more than 50 percent of the American market, fearing the

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<sup>45</sup> SANFORD M. JACOBY, *THE EMBEDDED CORPORATION: CORPORATE GOVERNANCE AND EMPLOYMENT RELATIONS IN JAPAN AND THE UNITED STATES* (Princeton University Press 2004)

<sup>46</sup> *N.Y. Late Market Comment -3: Again, “Goldilocks” Economy*, (Dow Jones News Service, New York, N.Y.), June 12, 1997.

<sup>47</sup> Gregory Zuckerman, *Spasms Aside, Bond Outlook Seems “Just Right,”* WALL ST. J., October 6, 1997, at C1.

<sup>48</sup> Carol J. Loomis, Patricia Neering & Oliver Ryan, *The Tragedy of General Motors*, FORTUNE, February 20, 2006, at 58.

antitrust officials would say it is time to break up GM.<sup>49</sup> They are now slipping down to what will probably be this year 23 percent of the American market.<sup>50</sup> One financial press report after another flirts with the idea of bankruptcy. People look around, and they see IBM, a quintessential American success with \$8 billion dollars in profits freezing their pension plan. They are eliminating the defined benefit plan and going to a defined contribution approach.

There have been a number of recent books focusing on the new, global economic challenge. David was kind enough to mention mine. I would also recommend Robert Adkinson's: "The Past and Future of America's Economy." Pat Choate has a wonderful book out called "Hot Property," focusing on the role of intellectual property, another element of long-term growth that you will be talking about later today.

There is one book, of course, that has really caught the attention and imagination of the American people, and that's Tom Friedman's "The World Is Flat." I see people reading it on the subway, and I talk to young people who say "Oh, my assistant secretary said I had to read this." So the very challenges that David has been reporting about and I have been writing about have suddenly become much more the subject of everyday conversation.

We have gone quickly to puzzled discussions around the water cooler, where someone marvels: "I was trying to fix my computer, and you know, I ended up talking to somebody in India."

Now people are saying, "They are reading X-rays in India." Radiologists are worried. Chip design, architectural work, legal research – anything that can be digitized and analyzed can be done anywhere in the world where you have the talent and broadband capacity.

Suddenly you have millions of people who thought they were shielded from global competition, who find themselves very much a part of it.

Going forward, we will find, as David suggested, many countries looking at how they can become more effective innovators. The United States is a bit further down this path than are the European or Japanese companies, but we are all moving in that direction.

There are, however, major changes in the nature of our innovation system that will complicate how we go forward. There is now much more private than public research spending, but it is mostly on the D not, the R side.<sup>51</sup> The old Bell Labs and similar company research labs that did long-term research

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<sup>49</sup> *Id.*

<sup>50</sup> *Id.*

<sup>51</sup> Gautam Naik, *Corporate Research: How Much is it Worth? – Top Labs Shift Research Goals to Fast Payoffs*, WALL ST. J., May 22, 1995, at B1.

have essentially disappeared.<sup>52</sup> They may exist institutionally, but they play a very different role.

The military is ever more aware that the old spin-off idea, that you had an idea, a military market, and the technology eventually ended up being a commercial success, has been joined by the so-called spinning on, taking innovations that are developed in the private sector and adapting them to military purposes.

There is not a governor in the country that does not look at his or her big State university as a source of innovation. The governors are working along the lines that David suggested of trying to get universities and businesses to work together more effectively. From the state point of view, they hope to see innovations that add up to wealth creation and job formation in their own states. State initiatives are part of the proliferation of partnerships that include, as I suggested, national laboratories, universities, and different kinds of educational institutions.<sup>53</sup> Perhaps the biggest single change is that, just as production was globalized in the 1980s, now, research and development are being globalized.

Globalization is a particular challenge where technologies have a national security application and there is a concern about how rapidly that technology is spread and shared. In other cases, globalization can create an enormous opportunity. I thought one of the most hopeful signs was when the initial fears around SARS triggered a global response. Some of the best minds in Japan, Europe, and the United States were all trying to solve this problem.

That creates enormous opportunities, but it means, particularly in Canada, the United States, and Europe, where we may have thought, that if something had been invented then it was probably invented here. We are all going to have to become much more adept at thinking about how to form a partnership with a brilliant Indian or in the case of ethanol, the Brazilians who have raced ahead with the development of new strains of sugar.

In the United States, we have one weakness that is not too hard to fix—a decline relative to the size of our economy in terms of investing in the physical sciences—engineering, computer science, physics, and so forth.<sup>54</sup>

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<sup>52</sup> *Id.*

<sup>53</sup> See, e.g., Frank E. James, *Chicago University, National Lab Seek Profit From Ideas – School, Argonne Set Venture to Help Commercialize Scientific Discoveries*, WALL ST. J., Oct. 15, 1986; Karen Lundegaard, *Region Banks on Growth in the Biotech Industry*, WALL ST. J., Nov. 17, 1999, at S1; Bill Richards, *Fund Set Up to Tap U.S. Lab's Discoveries*, WALL ST. J., Feb. 14, 1989.

<sup>54</sup> *Testimony on the President's Fiscal Year 2005 Budget Request for the Physical Sciences, Mathematics and Engineering Before H. Comm. on Science*, 108<sup>th</sup> Cong. (2004) (submitted by Dr. Charles Casey, President, American Chemical Soc'y; Dr. David Eisenbud, President, Am. Mathematical Soc'y; Dr. Catherine A. Pilachowski, President, Am. Astronomical Soc'y; Dr. Helen Quinn, President, Am. Physical Soc'y; Dr. John Steadman, Presi-

The much bigger problem is that we now face a global competition for the kind of talent that used to flow automatically to North America. Europeans are actively competing for that talent. They realize that part of the North American success has been the Chinese, Indians, and other people from around the world that have come here to study and work.

I knew it was serious when I heard that a French laboratory had changed its official language to English so they could attract Indian and Chinese scientists.

India and China themselves are actively competing to bring that talent back and to keep that talent at home. To amplify one of David's points, China's vision for the future is to create a thousand University of Michigans, a thousand large research institutions. They are intent on producing their own top quality Ph.D.s and no longer depending on European and North American institutions. All of that puts enormous pressure on the United States to make major improvements in an inadequate K-through-12 system that varies enormously in terms of quality.

Looking at the future, a renewed commitment to developing new sources of energy can play a very important role in the North American context, not only as a potential area for collaboration, but also in exciting young people across North America about the potential and the importance of innovation, science, and engineering, much as the space program did in the 1960s.

If you talk to people my age who are in science or engineering and you asked them why, what got them interested, a high percentage will say it was the space program. Most did not end up working on the space program, but it showed them the adventure that science could be. It was national security, it was new frontiers, it was moving forward.

I think energy could play that same kind of role. How are we going to lift two-and-a-half billion people living on less than \$2 a day out of poverty without new sources of energy? It is foreign policy; it is saving the climate; it is giving us a new kind of national security.

If we couple a national focus on energy with a real commitment on the research and development side, as we did in the 1960s with space, I think it could help transform our K-through-12 education system that badly needs transforming.

Let me stop here.

DR. KING: Thank you very much.