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I would like to talk about three aspects of innovation in competitiveness as we look to the future. First is innovation itself. Second is the question of short-term versus long-term pressures and how we may be sacrificing our future for the present. Third, I am going to speak about innovation in a global context and about trade policies.

Let me begin with the question of innovation itself. It is very interesting, to look back in the literature of the late 1970s and early 1980s, and see the gradual recognition in the United States that something was not quite right within our economy. We had had a spurt of inflation, part of which was generated by OPEC. There had been a series of improper responses and we had gone through a series of experiments with monetary policy while trying to decide whether or not we would control interest rates or the money supply. In all we had a great upheaval in our economy.

In that period and through the 1970s, we also began to see that many of our industries in the United States were not measuring up, either against our own prior performance or against the performance of other countries. So by the late 1970s, we saw our major steel industries and many of our labor-intensive industries in great difficulty. In addition, we saw the automotive industry being challenged here and abroad.

The response to this was that this was a natural consequence of the evolution of market forces in redevelopment, and that it was not something to worry about because ultimately we would have a higher order, with higher value and added possibilities generated through high technology and the innovation process here in the United States. It is intriguing to take a look at the literature in 1981 and 1982, with the succession of learned people, politicians and business leaders who, in effect, said, "Yes, it's okay to have these dying industries and to see a decline in basic manufacturing, because we have the potential for high technology to save us." In one way that analysis is understandable because in 1980 and 1981 the United States had a dominant position in technology and innovation in the world marketplace and a trade surplus in high technology trade of $28 billion.

However, we learned over the decade of the 1980s that that dominant position itself was vulnerable. Throughout the 1980s, and particularly a decade later as we enter the 1990s, there is evidence that the

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processes of innovation in this country are in and of themselves not assured. This is a reflection of the fact that the current direction itself may not be appropriate. For if everything were going well and had the prospect of being better, this Conference would not be necessary.

The question we face on the matter of innovation is essentially threefold. How do we assure that we will have the people to do the innovation and that they will have both the competence and latitude to undertake that innovation? This focuses on the need to address the basic educational system in this country. In fact, it says even more about the higher education institutions in this country and the need for investment in capital facilities, graduate programs and faculty in order to retain those already in the system. It also says something about the relationship between the public and the private sectors regarding innovation and the technology process.

Looking at this balance around the world, one of the things that leaps out is that the European Community has joined together and is putting substantial resources into the innovation process. They have a series of projects, such as EUROPA, EUREKA and others in which governments and businesses across borders are joining together, at least in the precompetition stage, to do what is necessary to develop the generic technologies that are essential for further development and commercialization. In part, this reflects the realization that Europe in the 1970s was becoming stagnant, that technology is a central part of their aspirations and that it would be necessary and useful to work together.

When looking at the Orient, we find the same pattern, but it is a pattern that was established much earlier. For example, since the early 1960s the Koreans have been engaged in a series of cooperative technology projects. The Korean government and industry are now joined together in thirty-two specific projects on innovation and technology where they have consortia working at the precompetition stage. Japan also has a very sophisticated, well-organized and focused effort through which businesses and governments come together at the precompetition stage. It is interesting to note, when looking at the history of that process, that it was, in effect, the Allied Command in 1948 that began the project; it was the United States, as an occupying power, that created the instrument and the agencies to have a cooperative research and technological development program.

Over the past forty years the Japanese have refined and developed many ways to aid industry, including cooperative research all the way from basic research to commercialization. At the same time, they were fully prepared, and willing, to extend beyond the innovation process, and to encourage and permit cartels in the development and commercialization stage. In these cartels businesses can come together in the commercial stage, as well as the precompetition stage, to engage in an organized forum which is sometimes predatory and sometimes benign, but which can be used to strategically penetrate and seize markets on a global basis. That is a very important factor.

The final issue concerning innovation is the time perspective that companies and scholars have to engage in the process of innovation. In 1976, there was a very interesting report from the National Science Foundation on their science indicators. We began to understand what was happening when we realized the importance of the time perspective for innovation. In that 1976 report, which was the only time that this section was included in the biannual science indicators, there was the observation that the situation within the United States was changing. Until then, there seemed to be a pattern that firms concentrated on massive breakthrough technologies, such as xerography, for example, or the development of the integrated circuit. But the 1976 report observed that there seemed to be less attention focused on these breakthrough technologies and that fewer firms were engaged in the process. It also noted that large and small companies were increasingly devoting their resources to the refinement of existing technologies.

In retrospect, it seems reasonably obvious that an increasing number of firms could not afford to wait. They simply could not afford to spend the fifteen years that would be required to develop the xerography processes. Likewise, the pharmaceutical companies could not afford to invest their monies into pharmaceuticals that might not pay off for 12, 15 or 20 years. The pressure on them was for immediate results, but I think this has shifted radically.

In many cases, the fundamental nature of innovation in the United States has harmed us in the long-term, because it has meant that too often we were unable to take our scientific breakthroughs and translate those breakthroughs into commercially viable products. More importantly, it meant, as we are seeing today, that when this happened with our medium and small-size firms, they were frequently forced to go to external sources for the patient capital required to develop those technologies, regardless of the potential benefits from those technologies and innovations. What is happening in innovation is not distinctly different from what is happening in the society at large, in the investment community in this country and in the investment environment in which our corporations operate. We noticed roughly fifteen years ago that we are becoming a short-term society. We have literally become a capitalist system which, like our consumers, focuses on immediate returns and immediate gratification. This has enormous consequences. It means that we short our capital investment, pull back on our research and development investments and fail to make the necessary investments in our human capital, all of which are required to be productive and competitive in the long-term.

As I see it, we have a situation that is not the fault of business, nor is it the fault of the business schools. One of the complaints that Abernathy & Hayes made in their famous article in 1980 in the *Harvard Busi-*

ness Review is that one of the reasons that we were managing our way into decline and had such a focus on the short-term, was because of the structure of our training and education programs in the business schools, which equip people with the tools of discounted cash flow and a variety of other financial analysis. I believe that is incorrect. To blame the business schools for the short-term pressures is equivalent to blaming West Point for war. What is happening? These institutions are training people to operate in the environment the way the environment exists — and the environment exists today with a focus on the short-term.

There are several reasons for that. Part of that is the rise and glorification of the corporate raider in our society; but there are much more fundamental and structural reasons behind that. At the core of those reasons is the fundamental shift that has occurred in this country within our capital markets over the past twenty-five or thirty years. We have had deregulation and more importantly, ownership has shifted increasingly out of the hands of individuals and into the hands of institutions.

In 1952, financial institutions owned less than 5% of all the stock listed on the New York Stock Exchange. Today they own over 35% of the securities listed on the New York Stock Exchange. Peter Drucker first observed these trends in the 1960s and 1970s and began to write about them. In his writings, Drucker made the point that this shift had a potential benefit because these shifts could come in a way that would put capital into patient hands. That, in effect, we would have patient capital that would enable our companies to think and act long-term. What we see, however, is that something very different has happened. A major part of the capital in our country now falls into the hands of very impatient people, people who have been unable to resist what Lord Keynes calls the "animal spirits" of the marketplace. As a consequence we have seen, in the late 1970s and through this decade, a gorging of speculative hypertrading that has radically shifted the expectations and demands of our corporations, and has adversely affected our investments in innovation, capital facilities and worker performance.

We can measure this in a variety of ways. One way is simply to examine the large block transactions of 10,000 shares or more on the New York Stock Exchange. In 1965 there were, on average, nine large block trades a day. By 1980 there were over 500 large block transactions a day. By 1986 there were roughly 2600 large block transactions per day. Last year there were 3600 large block transactions per day. The financial institutions now do over 90% of all the trades on the New York Stock Exchange. Not only is this changing corporate behavior, it is also not necessarily beneficial to the institutions themselves. One West Virginia teacher's fund with $2 billion in assets did $80 billion in trades and lost $200 million of their basic capital in the process last year. That is an extreme example, but it points out a hyperturnover that is occurring.

Now, what makes this striking and increasingly important, is the fact that, because of this hyperspeculation, the total value of the New

York Stock Exchange is turning over at an increasing and accelerating rate. In the early 1980s, the total value of the New York Stock Exchange was turning over roughly once every three years. In the 1960s it was turning over every five years. Today it is turning over approximately every fourteen or fifteen months. That is important, because more than half of the stock of the 200 largest corporations in the United States, and that includes TRW, is in the hands of institutional investors.

The institutional investors are temporary owners, short-term owners, and they have absolutely no corporate loyalty. Their loyalty is solely to the numbers — and those numbers, increasingly, are what was done last year, last quarter, and in some cases last month. These are very fluid circumstances. It is a very foolish CEO and Board of Directors that is not concerned about the short-term price of their stock and the short-term earnings of their corporation. This, in turn, translates into enormous pressures again to make reductions in investment, innovation and research and development. Today there are only a handful of companies that have both the earnings and the prospects for the future that will enable them to ignore these short-term pressures to both satisfy the demands of the marketplace as it now operates and at the same time make the investments in innovation that are required to compete in the long-term future.

The third major point that I want to cover is the shifting nature of trade policy. It is appropriate to discuss this with a group drawn heavily from Europe, Canada and the United States. It is important for us to recognize that we are in the midst of a shift in trade policy today, and that this is as significant as the shift that occurred between 1943 and 1948, though less dramatic.

It was during that time that the United States, Canada, England and the European countries began to design what would become the post-World War II trade system. It was a trade system that we built on the philosophical and intellectual writings of Adam Smith and David Ricardo. A trade system built in the image of economics, as we understood it, and a trade system built under the assumption that the best way to expand global trade was through an open-trading system. So for forty years we have had as our objective the completion of that vision, a vision based on expanding the concepts of free and open trade.

It is a powerfully elegant model and an attractive model. It is by far the superior economic approach and model by which one can engage in trade, but it is also incumbent on us to say that it is not the only model that exists in global, political and economic theory. Other models have varying degrees of success and often do quite well. It is these other economic models, particularly in Asia, that have had the largest and best growth, and that stand as our principal competitors today.

It may be unrealistic for us to assume that other countries that have adopted an economic model, which has worked enormously well for them, will be willing to alter their economic model and adopt a model that serves our interests. That may be a high and unachievable expectation. We need to start with the recognition of the differences in economic models and approaches that are occurring.

Our model, the model that was developed in England and adopted by Canada, the United States, some other countries, and to some degree Germany, is a model that is essentially based on the concept of process. It is a model based on the concept of rules. In other words society and business will set the rules. Then within those rules, the market processes are permitted to operate. That which is not prohibited is permitted. It is an enormously successful model. It is a model that is based, at its philosophical heart, on the understanding of the benefits of individual greed. It is a model that attempts to productively channel individual greed, and it has worked very well for us as it has evolved over the past two centuries. Certainly, when the United States, Canada and England dominated the world economy in the mid-1940s, it was the model that we wanted others to adopt. We put processes into place that were based upon a particular structure. So what we had, for example, was the IMF, exchange rates and the World Bank to channel capital. In addition, we created a mechanism that would facilitate that form of a trade structure.

Originally, we attempted to create something called the International Trade Organization ("ITO"). The ITO was to be a super-national body that would have the power and strength of the International Monetary Fund. The United States created that mechanism, led by Harry Dexter White, and convinced other nations to adopt the charter, but our own U.S. Senate refused to ratify the ITO charter.

The General Agreement on Tariffs and Trade ("GATT") was originally created as a separate agreement to deal with tariffs and merchandise trade, and it was to be fit into the ITO. But because the ITO was rejected, we were left with the GATT as the principal instrument on trade. For forty years, through successive rounds of GATT negotiations, we have attempted to take that limited instrument and modify it so that it could facilitate global trade. However, it is important to recognize that even after all of these negotiations and all the hopes we put in it, the GATT, while it covers most trade merchandise and some agricultural trade, presently covers less than 7% of global commerce because it does not deal with services, capital flows or investments, and it does not deal with the major emerging forms of commerce in the world today.

Equally important, is that we see these other economic models at work. We see a failed Marxist model, but it is still there and it will continue to be there for some time. Further, we see a new European model which has been adopted to some degree. In that model there is a closer relationship between business and government than in the United States, where the relationships between the state and banks are very different. We also find the Asian economic model that attempts to blend the power of the state with the flexibility of the marketplace and, in effect, marshalls the whole of society's resources to achieve a goal. This illustrates the connection between the power of government and politics. This model simply does not exist here in the United States, and I would submit that it does not exist in Europe either. The point that I would like to make is that the Ricardian model of trade is used in roughly 25% of the world's commerce today, while 75% of the productivity and production in the world uses very different, or slightly different, sorts of economic assumptions or models.

For over 200 years, we have developed and refined ways to productively channel individual greed. We understand how to do that. This system is not only elegant, but it is productive and works well. On the other hand, we do not understand the concept of *national* greed. We simply do not understand, and our policies do not reflect, societies that are fully prepared to subordinate the interest of consumers for several decades to achieve a greater long-term societal benefit. We do not understand a society that is fully prepared to emphasize the benefits of producers over the benefit of consumers.

Our global trade structure is at a point where we must find a different way to think about global trade. For those of us in the United States, it is now time to develop a much sharper and finer appreciation of the cultures and politics, economic systems and national aspirations of our trading partners. These countries are not an exotic extension of us, they are different and it is now incumbent upon us to understand these differences.

My criticism of this country, in the business, academic, political and intellectual communities, is that we make very little effort to understand and to know other languages, for example. Learning another country's language is the easiest way to begin to understand another country, yet we do poorly in that effort. We must go beyond language. We must understand other things as well. We must step back, take a look at our trade policy, and recognize that the post-World War II policies that we championed, both strategic and economic, were appropriate for that time, but they may not be appropriate for the future.

In retrospect, our policy of containment of the Soviet Union seems to have been a brilliant success. Kennan was a brilliant architect of a policy that required patience and the expenditure of an inordinant amount of money. Increasingly, it appears that the strategy succeeded. The fires of the Soviet revolution were contained until a more responsible society could evolve, and that finally seems to be happening.

It is important for us to say that our policy, based upon an Anglo-American concept of free trade, of peace through prosperity, our willingness to make a disproportionate sacrifice to achieve the opening of our markets at a faster rate than other markets by our expenditure of capital abroad and our willingness to transfer technology to other countries, succeeded gloriously. What we saw between 1950 and 1973 is the largest, expansion of economics in trade and commerce in world history. As it is appropriate for us to alter our strategic post-World War II relationships with the Soviets, it is perhaps equally appropriate for us to now alter our trade policies to reflect the shifting nature of the times. At its heart we are saying that we in the United States no longer necessarily champion free and fair trade for everyone. In effect, we are saying that without attempting to punish others for their success and without attempting to reverse their progress, we are fully prepared to tailor our trade policies to deal with other countries as they are.

If we are dealing with a Marxist economy in the Soviet Union, and they have a managed trade economy, then it is necessary for us to have a managed trade relationship. If we are dealing with an economy that is based upon free-trade principles, as the Canadian economy is, then we will do everything in our power to ensure that the agreement works, because we will both benefit. If we are dealing with a results-oriented society and a results-oriented economy, as in Japan, Korea, Taiwan and a number of other developing countries in Asia, then it may be appropriate for us to devise a results-oriented trade strategy for dealing with them.

In sum, it seems that the challenges we face on innovation are the challenges that we have identified in this program during the past two days. One of those basic challenges is to find ways to increase the level of investment in the innovation process. In part, that has to be facilitated by increased investment by the government. Not only is it necessary to fund basic research and development, it is probably going to be necessary for us to fund activities at the precompetition stage, just as is being done in Europe, Japan, Korea and other countries. Given the sophistication and level of competition in these countries, if we do not make these investments, we will be worse off.

The second thing that we must do is find a way to make investments in the technological infrastructure of this country. At a minimum, we must find the means through grants, loans and scholarships to encourage a generation of Americans to enter the science, technology, mathematics and business fields, and to be willing to teach. This is not an insignificant commitment of resources, but given our aspirations, it is an absolutely mandatory investment.

We must make a substantial investment in the infrastructure of our university systems in this country. The National Science Foundation reports that we need approximately $40 billion to $55 billion in buildings, laboratories and equipment for our major academic institutions. This is important for a very simple reason. In our model of economics, the universities play an unusual role. If they are to continue to play that role, we must make the investment. If we want to have state-of-the-art research and technology, we must make a state-of-the-art investment in those institutions.

The third major point regarding innovation is that we must find a way to enable our companies to come together in consortia as the common way of doing business. What is striking about the Sematech experience is the soul-searching that has gone into it, especially when it has been so obvious that semiconductors and that whole range of technology is the lynch pin to most of our future. We sit here and wonder whether or not we should go into the enterprise or whether the investment should be made. Now we are trying to decide whether the high definition television enterprise should be undertaken. We are quibbling over $30 million on that venture. We must move beyond this. We must make cooperative relationships between businesses and between business and government a common and accepted thing.

As for the capital markets, we must stop the hyperspeculation. The raiders and the economic buccaneers do perform a function, but they have gotten out of hand. This distorting behavior will be harmful to our country in the long run. The way to deal with this is not to ban takeovers, because many takeovers should happen due to incompetent management and the need for an infusion of new managerial spirit. The way to limit this behavior is to use a market-oriented approach. In other words, change the market environment so it will favor the long-term over the short-term. I advocate ending the tax exemptions that financial institutions now have in the trades of their pension funds and short-term activities. I also favor a reverse capital gains tax, a high tax on short-term trades that would drop off to zero, or a stock transfer tax such as the Japanese have, or some combination of the two. Such an approach would permit takeovers, but it would not permit the in and out, the greenmail and the other activities. In effect, it would create an environment that would ensure that if a merger or takeover was made, it was done for long-term economic reasons and not for short-term speculative reasons.

The final area is the question of trade policy. I think that we should: 1) continue the GATT negotiations; and 2) recognize that the GATT, as an instrument, will probably have limited application for the long-term because we are simply dealing with too many countries and too many different levels of development. It is probably time for us to think of how we engage in a series of bilateral relationships, as we have done in the Canada-U.S. Free Trade Agreement, how we establish some pragmatic plurilateral relationships, perhaps a relationship between the United States and Canada as a block and the EC or between the United States and the EC, and then to identify a series of plurilateral relationships where we have common interests. An example of this is the protection of intellectual property rights, which is a little understood but critical area that is of interest to the developing nations of the world. Next we should identify the other things that we can do through a multilateral framework. I think this would give a long-term impetus to the GATT. If the GATT is the way, it is more likely to succeed if it has a stronger backing.

In conclusion, I think this country enters the 1990s under vastly different circumstances than it entered the 1970s and the 1980s. We no longer have automatic superiority. We are no longer the creditor nation, nor do we enjoy across the board industrial supremacy. Increasingly, we are dealing with equals, and in many cases with superiors. Our policies must reflect that. Our policies must do what is necessary to cut consumption, increase investment, and deal with other nations on a much more pragmatic and a far less theoretical basis.