

4 National Priorities for Science and Technology: A View from the Industrial Community

Deborah L. Wince-Smith

The mission of the Council on Competitiveness (honed over the last 16 years) is to set an action agenda to drive U.S. economic competitiveness and leadership in world markets while increasing the standard of living for all Americans through greater productivity.

Since I assumed my new role at the Council, I have talked with a number of economists, professors, and policy experts as well as chief executive officers (CEOs) in industry who served on John Young's Commission on Industrial Productivity (which was the baseline for the establishment of the Council in 1986). A professor at the University of California, Berkeley told me something daunting. It took them close to eight months to get a consensus to begin to even define economic competitiveness.

The Council has since developed a portfolio of products, findings, and recommendations on benchmarking national and international economic performance and on upgrading the U.S. work force skills. Increasingly our work is focused on strengthening the U.S. platform for innovation at the national, regional, and local levels. Our work has received a lot of international recognition. Recently we have been asked by the World Economic Forum to be their U.S. partner for the U.S. survey that they do as part of their overall global survey. We will launch that effort this year.

This chapter discusses our policy framework and the results of our work on the national innovation platform. This work is critical to our nation's strategic R&D investments and partnerships across universities, industry,

Deborah L. Wince-Smith is president of the Council on Competitiveness. This chapter is based on remarks delivered at the 27th Annual AAAS Colloquium on Science and Technology Policy held April 11-12, 2002, in Washington, DC.

and the globe. I also discuss one of the emerging challenges that is on everyone's agenda: How we are responding as a nation to the new security threats brought on by the war on terrorism? How can we protect our homeland and keep our economy strong? We have a template that focuses on both the long-term and emerging challenges that impact the private sector during this challenging time.

The Importance of the R&D Investment

The War on Terrorism and our response to it has great impact on the competitiveness of our economy. The Council's role is to look at how we can keep our economy moving and strong. Given the research and development (R&D) situation and other budget priorities, the private sector will have to invest more in partnerships with our universities and labs. But if we do not have a strong economy, that will not happen.

The R&D investments we made over the past 20 years deserve much of the credit for our ability to create new knowledge and powerful new technologies. This investment has had a huge impact on our economic prowess and growth through 1995. When you look back to the 1990s, it seemed as if America had invented a new way to do what had seemed to be economically impossible: Grow the economy, create jobs, and increase our standard of living without inflation. The United States was the only country in the world to achieve this. The major productivity growth and acceleration in the 1990s is highlighted in *The Economic Report of the President*. This document shows, for the first time in my knowledge, the direct link between productivity and R&D investments. It shows how information technology impacted the efficiency of our businesses and our markets. Most economists think that in spite of the economic downturn of 2001, our productivity acceleration will continue in the future. Over the past two decades, the 35 million jobs we created and the real income that was doubled in the United States is related to this innovation capacity.

The Need for a Balanced Portfolio

While industrial R&D is growing at a fast rate, we recognize that the growth is on the development side. Investment does not focus on the basic frontier research that is the seed corn and underpinning of our future economic growth. The Council's view is that the leadership of the federal government (the Administration and Congress) must ensure that we maintain long-term, high-risk investments in a diverse, crosscutting, and integrated set of research disciplines and priorities. In other words, we need a balanced portfolio.

This has been a long-term platform issue for the Council. (I also think it is important to look at the justification for this.) The director of the Office of Management and Budget (OMB), Mitch Daniels, Jr., and the chairman of the Council of Economic Advisors, R. Glenn Hubbard, came to our executive committee just before the budget was released. They told us that they recognized the long-term importance of this goal and assured the Council that in the next budget cycle, this will be a high priority. Also, Dr. John H. Marburger III and the President's Council of Advisors on Science and Technology are going to look at this issue. We also expect some fine work coming out of the White House Office of Science and Technology Policy on this. I think we will see progress.

OMB has had an effort under way over the past year to assess what should be the criteria and performance measures for both basic and applied research investments across government agencies. OMB is piloting this initiative with the Department of Energy's portfolio. The Council has been asked by OMB to be the private sector partner to help shape and give them advice on this issue. We will soon have a group of senior R&D executives from industry meet with us and OMB. They will look at the private sector's criteria and evaluation processes for R&D investment and results measurements, and how these could be relevant to the government's applied research portfolio.

Stimulating the Innovation Economy

How do we sustain the pace and power of the innovation economy? How can we address the national security challenges coming out of September 11 (as well as other broader globalization issues) in terms of regenerating a consensus for trade liberalization and the benefits of free and open markets?

National policymakers have traditionally focused on two principal means for sparking and stimulating growth: monetary stimulus through lower interest rates and fiscal stimulus through lower tax rates. A third means is targeted stimulus packages, as has been the case coming out of 2001 and the onset of a potential recession. These are vital macroeconomic tools, but sustained economic growth also demands another set of tools. These are the innovation stimuli that occur at all levels of the economy.

While fiscal and monetary policies pump dollars into the economy, it is the innovation process that infuses our economy with the opportunities for future growth. The investments, incentives, and linkages in the integration of this process provide the products and services that companies use to compete and obtain competitive advantage in world markets. In the Council's view (working with the White House, Cabinet agencies, and Congress), our national innovation capacity should be elevated to a first-tier economic and security priority.

We have had two national innovation summits, one at the Massachusetts Institute of Technology (hosted by president Charles M. Vest in 1998) and one last year at the University of California, San Diego (hosted by Robert C. Dynes). Out of these summits came a platform of innovation strategy with the following components:

1. We have to have excellent schools. The K-12 challenge is a daunting one. We have lots of initiatives underway and it is a high priority of the President and the country at large.
2. We need a world-class work force. Every worker in America must have the opportunity to obtain and renew the skills necessary to prosper in this global economy.

3. We need the breakthrough discoveries and transformation technologies that enable the technology products and services of the future.

4. Inventors, entrepreneurs, and small, medium, and large companies must have access to stable and affordable capital at all stages of the innovation cycle, from the time of conception to product deployment. Transforming new ideas and new inventions takes energy and vision, as well as significant amounts of money.

5. There clearly is a tremendous shortage of American students choosing to study math, science, and engineering. We must increase the science and technology talent base of our country.

6. We need a framework for regulatory processes at the national, regional, state, and local levels that balances our need for safety and oversight for the public good with the ability of our private sector not to be impeded or undercut by a regulatory environment that is anti-innovation. This regulatory challenge is of great significance to the private sector in terms of the new security needs for protecting their operations.

7. We must have global access and experience success internationally. The growth in markets is outside the United States. If our companies do not have access to that trading environment on equal terms, our economy will suffer tremendous long-term detriment.

Innovation at the Regional Level

To keep the economy strong and at the forefront for contributing to our war on terrorism and protecting homeland security, we have to look at where innovation occurs. The Council has done some very interesting work on the concept that innovation occurs at the regional level and that the concept of clusters of innovation is at the heart of the dynamic growth, diversity, and success of regional economies. We defined clusters as geographic concentrations of competing and cooperating companies, suppliers, service providers, universities, community colleges, government entities, and other associated trade and public policy organizations.

Under the leadership of two of our executive committee members, Bell-South CEO F. Duane Ackerman and Harvard University professor Michael Porter, we studied a number of regions to see how the innovation productivity and prosperity cycle works and to identify the elements of this economic growth model. We wanted to understand what a regional economy is and how clusters come together to develop and deploy collective assets to enable productivity.

We had three main questions: What are the roots of local innovation capacity? Why are industrial clusters so important? How can a region build on its assets and its comparative advantages?

The National Governors Association (NGA) is very excited about this work. A governor's primary mission is to deliver economic prosperity in his or her state. Governors realize that the innovation template for growth is one of the ingredients for success. Over the next few years, the Council is going to work with the NGA under a partnership launched by Michigan Governor John Engler.

One of the key policy questions is why some regions succeed and others fall short. We realized that the formula for regional economic innovation is very complex. It involves intense competition, intense collaboration, and integrated networks of support that encompass both the public and private sector assets and their investment strategies.

We developed a very early checklist of some of the dynamics of economic regional success. We call them "the imperatives for regional innovation." The first imperative applies to a region considering how it can build on its strengths for future growth. The leaders have to inventory their assets. They have to see what they have, what their base is, and what they are good at. For example, the Akron, Ohio, Chamber of Commerce did a cluster study on its own and found that materials technology was a highlighted area. University of Akron has a very strong polymer capability, which came out of rubber industry collaboration and the industrial base for the auto industry. But they did not have manufacturing on their list. In our discussion, they said that manufacturing is the former economy. Cleveland wants to be in biotechnology and medical devices. By the end of the discussion, we agreed that manufacturing capability and the ability to rapidly use that for adding value is a huge asset they have in their region. They are going to go back and assess that as one of their core strengths.

The second imperative is to build on your strengths. Two examples illustrate this. San Diego, which was one of the regions for our study, has emerged with great cluster capability in wireless technology and biotechnology. But during the study it came out that San Diego had begun to turn its back on its traditional strength of being a major military facility. The U.S. Department of Defense had done a lot of work in command and control systems in San Diego. We determined that this is a strategic asset that they should build into their core regional strategy. In another example, northern Virginia, which had a very early systems integration with strong defense contracting, has always seen the importance of that asset and integrated it into what they do in Internet technologies, networking, and connectivity. We have also seen some parts of the country assessing their strengths to determine how they can stake out their claim as clusters for homeland security.

One of the top imperatives is to invest in research. The differential rate of learning and how we apply it is key to economic competitiveness. Merck CEO Raymond V. Gilmartin acknowledges the pivotal role that university research can play in accelerating industry's agenda. They chose strategically not to add an investment to the central research facility at Merck, but to place that research facility at the University of California, San Diego. We will see more companies do that. (It is already happening at the Georgia Institute of Technology and other institutions.)

Another imperative is to build the talent. Those regions that have a skilled work force and positive partnerships with labor have an advantage.

Seed innovation capital in the technology commercialization process is also critical. The Bayh-Dole Act has had a tremendous impact on the commercialization of technologies coming out of universities and start-ups. But we have to be very careful how we move forward in dealing with the Bayh-Dole Act because some companies look at intellectual property both for building a portfolio that they can control and for use as blocking devices. Industry has expressed concern that a university or a national lab may have a key patent that they want to access in order to go forward with their product. Whether they can get access comes down to how licensing strategies move forward. We have to look at this carefully before we consider reopening and changing the core premise of Bayh-Dole.

Thinking economically, not politically, is also important. We have to cut across states and localities and create connections. Collaboratives are essential.

Champions and leaders are, of course, critical. We learned through this study that private sector champions and university leaders are absolutely essential for innovation. We saw the impact of this in Atlanta with the leadership of BellSouth CEO F. Duane Ackerman and Georgia Institute of Technology president G. Wayne Clough (see Chapter X in this volume) and the Georgia Research Alliance, which is being touted throughout the country as a tremendous success even by states who 10 years ago thought they were way ahead of Georgia. We can also see this in how Qualcomm CEO Irwin Jacobs played a huge role in building up the assets of the University of California, San Diego and the associated networks.

The Council has tremendous interest in the regional innovation work being done by our international trading partners. In the aftermath of September 11 we have seen concerns about our economic model and the lack of trade consensus. A number of Administration officials and congressional leaders think that our ability to carry our economic innovation model to key developing countries in South Africa, Latin America, and the Middle East will be very important for dealing with some of the nonmilitary issues coming out of September 11.

Other Issues

Global Issues

The Council is beginning to work on some key globalization issues, including the harmonization of both competition policy and accounting and regulatory standards. These standards, being set in the European Community, will have a huge impact on the financial leadership of London and New York.

Some Council members from the financial industry are very concerned about the use of accounting standards to inhibit their ability to move into foreign markets. The recent corporate corruption issues (which include issues of stock options, retained earnings, and how companies deal with corporate governance audit structures) are providing ammunition to many

of our trading partners who would be happy to impose new regulatory mandates that would undercut some of the entrepreneurial strength of the U.S. economy.

Security Issues

The Council is very excited about launching an initiative to address how new security needs will impact the private sector's competitiveness. We are also moving aggressively to deal with public sector needs, especially in our public health infrastructure and in airport security. But many of these critical infrastructures—including telecommunications, food, energy, and water supplies—are controlled and managed by the private sector.

Companies that operate both at home and abroad now have huge security needs. They must protect their own facilities and people. And they must ensure safe access to the goods they need for supply chain management. The old model of building more fences and employing more guards is not going to work if they are to maintain their competitiveness and if the country is going to be safe and able to respond to terrorist acts both here and abroad.

So we are launching an effort to look at the connection between our investments and security. We want both done smartly and we want both to enable productivity for the long term. An interesting model for our private sector is how the Japanese treated quality in the 1960s and 1970s. When we looked at quality as a top-down added cost of business (a drain on productivity), the Japanese said that quality is something they build in from the ground up in their core manufacturing processes. Of course that strategy had a huge impact on their economic success.

Similarly, companies like DuPont have been leaders in building integrated safety management for hazardous chemicals and supplies into their core operations, not as an added cost of business. We hosted at Carnegie Mellon University in October (under the leadership of president Jared L. Cohon) a national symposium to address these issues. We tried to define from the private sector's viewpoint the type of security needed, how much is enough, and who will set the standards. This discussion could bring many government unfunded mandates, the re-regulation of the economy, and a decline in the competitiveness of our companies overseas.