WHY AMERICA MUST INNOVATE: A Call to Action

By Everett Erlich

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Introduction

Today's U.S. economy has created a remarkable paradox. It has grown at an average of 3 percent annually since the bottom of the 2001 recession, a reasonable rate by historical standards. After several years of flat employment growth, the economy has created two million new jobs in 2004 and 2005 and is on track to do the same in 2006. Yet, at the same time many – if not most – American families have a feeling of uncertainty and concern about the economy and their future.

Their concerns can be seen in the headlines and predictions we see daily.

- Despite the economy's overall, long-term success, Americans' median earnings are stagnating. In 1978, the median earnings (corrected for inflation) of full-time American workers were $37,004. In 2005, 27 years later, they were $37,447 – a mere 2 percent increase over the previous 27 years. American workers have, on the whole, lost a generation of economic growth.[1]
- This stagnation conceals a market divide in the labor force: the earnings (corrected for inflation) of workers who have finished college or acquired a post-baccalaureate education have risen in the last 20 years, but the wages of all those with less educational attainment have fallen.[2]
- When placed on an apples-to-apples basis, the U.S. produced 137,000 new engineers in 2004, while India produced 112,000 and China produced 352,000 (on an uncorrected basis, India produces 350,000 engineers and China produces over 600,000). But even these corrected numbers show that these emerging economies are capable of one day creating a high-tech economy the size of our own.[3]
- America's trade deficit has ballooned from $31 billion in 1991 to $362 billion in 2001 to $717 billion in 2005. Our bilateral deficit with China has grown from $13 billion to $83 billion to $201 billion in those same three years.[4] China, by the end of 2006, will have amassed *one trillion dollars* in reserves and will have the potential to exercise considerable influence over the course of the U.S., and world, economies.[5]
- The human resources consulting firm A.T. Kearny estimates that the financial services industry will send 500,000 jobs abroad in the next eight years, producing annual savings of $30 billion. Is any job untouchable? A leading investment bank recently relocated 50 junior equity research analyst jobs to Mumbai, where new

1. DeNavas-Walt, Carmen, Bernadette D. Proctor, and Cherly Hill Lee, U.S. Census Bureau, Current Population Reports, P60-231, *Income, Poverty, and Health Insurance Coverage in the United States: 2005* U.S. Government Printing Office, Washington D.C., 2006, Table A-2.
2. Current Population Survey, Annual Social and economic Supplements, U.S. Census Bureau, Washington, D.C.
3. "Does the U.S. Face and Engineering Gap?" *The Christian Science Monitor*, December 20, 2005
4. U.S. Census Bureau
5. *The London Times*, "Chinese Foreign Reserves to Exceed $1 trillion," March 29, 2006.

MBAs earn $30,000, as compared to $150,000 in the United States![6]

This paradox of concern amidst growth is even greater when we step back and look at the economy in a longer-term context. New technologies create products and services unimaginable a generation ago and revolutionize the way the products of a generation ago are produced today. The world has become linked in a way that only the most daring theorists of prior decades would have thought possible. And yet, these changes have brought many American families uncertain job prospects and stagnant incomes, even as they help the economy grow.

The powerful forces that drive today's economy come with no instructions on how to harness them. How will we create good jobs? How will we promote growth in our local economies? In short, how can we improve our *competitiveness?*

The answer is innovation. In this *Call To Action*, we discuss how competitiveness occurs, how it relates to innovation, and what states can do to promote it within their borders.

Let's begin by defining our terms.

The "Competitiveness Problem"

"Competitiveness" is a word with as many meanings as people who use it. To some, it represents technological prowess and being at the scientific "cutting edge;" to others, it means the ability to export and balance a nation's trade. Definitions such as these miss some aspect of the problem. Technological progress is hollow if it isn't accompanied by investment, which makes it part of the economy's daily workings. Exports do little good if they are won by cutting wages to win markets. This paper defines *competitiveness* as an economy's ability to generate high-wage jobs and support a high and rising standard of living. It can be seen in such measures as Gross Domestic Product per worker or per capita income, which measure the standard of living; or the growth in hourly wages and benefits or level of productivity (output per worker), which measure the value of workers and whether they receive commensurate benefits. As we'll see, the sources of competitiveness are complex, but the result is simple – creating high-wage jobs that support a high and rising standard of living. This is the heart of the matter.

Consider the issue from this perspective: China is growing rapidly, and has impressive rates of productivity growth. However, the growth and productivity is caused in large part because the wages its workers earn are low and its products cheap. The U.S. could emulate this growth by lowering its wages and incomes and churning out more goods and services, but we would obviously not be better off. The challenge for the U.S. is to maintain our share of the global market for goods and services without cutting the wages of American workers.

The definition of competitiveness used here demonstrates this fundamental distinction. The Chinese economy is *growing quickly* and has strong rates of *productivity growth*—factors that are helping it *become* competitive. But, by American terms, it is not yet fully *competitive* --

6. *Banking Strategies*, Vol. LXXX, no.1, January-February 2004, Chicago, IL

China cannot yet generate enough jobs that would recreate the American standard of living. However, as more and more high- technology, high-wage jobs migrate to China, its opportunity to become fully competitive grows.

This is the concern that creates the great dissonance many American families feel about the economy. It is growing, to be sure, and its productivity is increasing, but not to their benefit. In fact, it may be growing at their expense. The income data cited above shows that this is a long-term trend in the American economy, despite economic growth and growth in productivity. These trends demonstrate that the U.S. economy is dividing itself in two – a more competitive half that takes advantage of new technology and global trade opportunities, and a less competitive half that is at the mercy of these forces. The challenge facing policy makers at all levels of government is to move as rapidly as they can from the latter to the former – to take the innovative "high road" in terms of growth and competitiveness.

The U.S. is not rising to this challenge in the way it should. Perhaps the best summary measure of the economy's slipping competitiveness can be found in the World Economic Forum's September, 2006 *Global Competitiveness Report*, which dropped the U.S. from first to sixth in its ratings of national competitiveness, trailing Switzerland, Finland, Sweden, Denmark, and Singapore.[7]

Can our economy really be less "competitive" than Denmark's or Singapore's, despite its remarkable history and advantages? Responding to this lackluster performance is the motivation behind this *Call to Action.* It demands that we rethink how to induce the economy to grow and create good jobs and, from the perspective of governors, reconsider how the states participate in that process.

To do so, we must start considering how jobs and economic growth actually occur and the central role innovation plays in the process.

Where Do Growth and Jobs Come From? The Role of Innovation

How does an economy grow? How are new jobs created? The questions are simple, but the answers economists provide are often so elaborate or theoretical that they are of no use. However, an understanding of the process is necessary to promote growth and create new jobs.

At any moment in time, the economy produces a list of goods and services and uses various assets, or "factors," to produce them. These factors include physical capital, such as plant and equipment; financial capital, the wealth that funds investment; and intellectual capital, the accumulated knowledge mankind has embodied in its science and technology, engineering, and business practices. It also has a stock of labor and the skill that labor has, that is, the ability to harness knowledge to a task –sometimes called "human capital." Every product or service we see in the market is the result of combining these factors in some way.

If this is how economies produce, how do we increase their production? One way is to

7. The Global Competitiveness Report, 2006-2007, World Economic Forum, Geneva, Switzerland

simply "double the recipe" – to have more factors – more investment, more workers, and so on. However, doubling the recipe produces a cake that's only twice as big – in doesn't produce more output *in proportion to* the inputs. In economic terms, it doesn't lead to increases in productivity, or "output per worker," which is the basis for our standard of living. Instead, we need to get more out of the economy than we put into it, to make the economy more *productive*.

Economic history shows us that there are, at any point in time, a myriad of ways to become more productive. Economists put great store in the idea of "learning by doing," the continual stream of tinkering that leads to incremental changes in every aspect of production. In the short term, these increments add up to ongoing productivity gains. They may come about by reconfiguring the plant floor, changing the software that directs customer service telephone calls, using artificial intelligence to do bureaucratic tasks, or repackaging an existing product to position it better for the consumer. All of these steps improve productivity – they create more and new output using available factors.

While these increments are valuable and important, they taper off when some natural limit is reached. Humans have reduced the four minute world record for the mile run, for example, by 17 seconds, but there are no three minute miles because human anatomy is not up to such a task. This reality has an important parallel in the economy. At some point, the improvements in productivity that are possible given the resources at our disposal – including the equipment, workers, and skill levels of the workers – will start to taper off. If we are going to continue to grow the economy's productivity and competitiveness, we will have to think of a new approach. There are no three minute miles because human physiology is a constant. Fortunately, nothing about the economy is constant.

This is where *innovation* enters the picture. *Innovation* is the process by which new ideas enter the economy and change what is produced, how it is produced, and the way production itself is organized.

Consider the epochal innovations of our lifetime: the integrated circuit and the resulting microprocessor and computer. This suite of new technologies has created entire new classes of products with embodied intelligence, from portable music players to flat screen televisions. It has changed the way most goods are produced, using such techniques as robotics, intelligent materials handling, or computer-assisted design. It has revolutionized the very way production is organized – substituting networks for pyramidal organizations, blurring the lines between suppliers and their customers through "just-in-time" delivery and value-chains, allowing companies to enter markets all around the world, and intensifying competition and consumer choice. All of these transformations increase productivity in their own right, by finding ways to make "new" and "more" output from the same stock of resources. By setting loose these larger changes, the computer has unleashed a vast new frontier in which businesses can experiment, learn, and create a new wave of incremental improvements that allow productivity to continue to grow. The result is more income per person, greater productivity, and the potential for new and high-value jobs – in a word, competitiveness.

All of this may seem old hat, but the process that led to these changes was as complex as

the outcome was simple. Think about what was necessary to bring this transformation to fruition. New technologies don't appear out of nowhere. Someone must have the knowledge and imagination to conceive of them, and devote the resources to the experimentation that leads to them. Someone must take on the risk associated with designing and investing in their production. The scientific and engineering knowledge that is a prerequisite to inventing, producing, and using the innovation must exist and be disseminated. Only if all of that happens – only if all of those preconditions are met – could an economy take great leaps ahead. But if all of it did take place, the economy would grow and create many new and "good" jobs – jobs that allow people to become more productive and raise their standard of living.

The word that summarizes this economic leap forward is *innovation*. An economy can't sustain its productivity growth unless it continues to innovate. This is all the more true when we think about the role of foreign trade. We already have seen how Japanese, Taiwanese, and Korean auto and electronics firms have captured markets in which American producers were more competitive in the past. They have done this by combining the most modern production technologies – thanks to the mobility of capital and scientific knowledge – with a workforce that is highly skilled but not as highly paid as its American counterpart. Now that China and India have opened their economies and started making heavy investments in increasing their technological capacity, they are threatening to do what others have already done, only on a much larger scale. To make matters worse, recent developments in information and communications technology have "globalized" the market for many service and manufacturing industries. Digitalization and the Internet enable programmers, accountants and radiologists abroad to compete directly for jobs that once had to be done on-shore. The only way our economy can compete in this brave new world without reducing wages is by out-innovating the competition and thus reaping the market premium gained by "first movers."

This reality poses stark choices; in response to this inevitable competition, we can take the "high road" of innovation or the "low road" of reduced incomes. We can innovate and improve ourselves, or we can allow wages to fall and compete by making ourselves poorer. Only the "high road" leads to competitiveness – and, once again, *competitiveness* depends upon *innovation*.

But *innovation* is not just *invention.* One needs all of the steps of the *innovative process* to improve competitiveness. An educational system must produce the knowledge that allows people not only to conceive of new inventions, but to figure out how to produce them and develop the skills necessary to use them. There must be a pool of savings available to invest in the research and development needed to produce these inventions and the investments that must be made to bring them into production. The economic environment must be conducive to growth – it must be stable, avoiding booms and busts and debilitating inflation. The economy must have the flexibility that allows for change – allowing production to be reorganized quickly and efficiently, giving workers the tools to move from old employment to new ones (a workforce with transferable knowledge and skills), and distributing the benefits of these innovations in ways that create and maintain a strong social consensus that economic change works for the benefit of all.

Moreover, in order to innovate, businesses must have a model and culture of innovation – and a system of governance – that lead them to take the risks necessary to shepherd these inventions into useful products. Innovation depends on reinventing strategies, products, and processes and creating new business models and new markets. It is about selecting the right ideas and executing the business strategy quickly and efficiently. It requires vibrancy and alertness in our businesses; new ideas sometimes come from laboratories, but many come from being in contact with customers or suppliers, adopting existing technology for a new purpose, or research that becomes incorporated into a firm's product development strategy via a local business network or collaboration.

Innovation is a hallmark of a successful economy, and it lies at the heart of how economies grow and where good jobs come from. Moreover, *innovation* is the only means by which a high-skill, high-wage economy can successfully compete with high-skill, lower-wage economies without reducing wages. Thus, *competitiveness* for the U.S. in particular depends on the rate at which we *innovate*. The process that creates innovation is a multi-faceted and goes far beyond invention alone. This leads us to consider how government at all levels – and, principally, states – can affect the innovative process.

The Role of Policy and the States

While competitiveness is a national phenomenon, states play a critical role in determining it and in making the economies within their boundaries more competitive, as well. This is not hollow theory – it is the real-world stuff of which jobs and growth are made. Let's return to the World Economic Forum international competitiveness rankings mentioned above. The U.S. slide from first to sixth in the world was based on the Forum's assessment of our performance in all of the diverse steps of the innovative process. For example, the U.S. was regarded as either number one or two in the world in market efficiency and technological innovation, as would be expected. But it was twelfth in infrastructure (immediately trailing Belgium), 27th in the quality of its public institutions (including prominently the quality of public services and government management, behind Chile and barely ahead of Portugal) and, shockingly, 40th in the world in the areas of education and health – directly behind Bosnia and Bulgaria, and immediately ahead of Ecuador, Malaysia, and Estonia. U.S. macroeconomic policies were regarded as 69th in the world – between Slovakia and Poland! Seen in their totality, these rankings tell us the private sector has been doing the job asked of it, but the public sector – the custodian of American infrastructure, education, health care, and economic policy – has failed to live up to its responsibilities.

The magnitude of the competitive challenge to the United States demands a response, and governors must respond proactively and aggressively. They must increase public awareness of both the problems we face and the opportunities to address them, by speaking out and setting expectations.

Innovation combines human, intellectual, and financial capital. Promoting innovation, therefore, requires expanding those sources of capital and improving the way we combine them. Human capital heads this list. But, as we've seen, American students are not attaining the level of

knowledge they need in science, technology, engineering, and math, and are falling behind their peers in many other countries. Nor is the United States producing sufficient numbers of the skilled scientists and engineers needed to create tomorrow's innovations. An innovative economy requires well-aligned investments in education, R&D, and entrepreneurship, particularly at the early-stages of investing on which innovative entrepreneurs depend. But U.S. non-defense R&D still lags major competitors such as Japan and Germany as a share of our economy.[8]

This *Call to Action* focuses on two tasks – "setting the stage" for broad economic growth, and "building on strengths" through targeted programs to build local economies. Governors need to develop and implement both strategies over two different time frames; both approaches are critical to preparing states to compete in the 21st century world economy.

Policy's First Job: "Setting the Stage"

The failures highlighted by the World Economic Forum share a common bond. Each is a failure of government to create a landscape on which economic activity can flourish – a failure to "set the stage" for competitiveness. Some of these deficiencies can be remedied by the federal government, but others fall directly to the states. At the highest level, the federal government must provide stage-setting policies that support innovation and economic growth. These include creating macroeconomic balance (including low inflation, stable growth, and adequate saving); providing public infrastructure; overseeing the governance of the largest private economic actors and the integrity of capital markets; putting in place a quality education system, particularly at the post-secondary level where the federal role is larger; performing the basic research that provides a foundation for other innovative efforts; and providing incentives and programs to promote scientific progress, among many others.

States play an equally compelling role in these stage-setting policies. While the federal government pays for about 7 percent of the nation's K-12 education costs, and local financing is also pivotal, the states are the primary drivers of educational policy and innovation, and the decisions they make will determine whether the K-12 education system succeeds or fails. States have taken the lead in setting standards and developing assessments and accountability systems for the nation's elementary and secondary schools, and, as the NGA Action Agenda for Improving America's High Schools noted, they play a leading role in aligning our high schools with the modern realities of the world economy. States are the lead actors in the nationwide effort to restore American excellence in science and math education.

This is also true of the higher education system, in which states fund the core of the post-secondary education system. States also play a central role in the provision of infrastructure, where their added funding has offset real declines in the federal role, and in the heath system, where they are the active partners of the federal government. States are playing an even more important role in establishing the broadband networks that will be a part of the infrastructure of the unfolding century.

8. National Science Foundation, Science and Engineering Indicators, 2006

States clearly have a central role to play in establishing the landscape on which innovation takes place, but they have a second role to play that is equally important.

Policy's Second Job: Building on Strengths

States, unlike the federal government, must operate in two worlds – the "general" world of providing a helpful economic landscape, and the "specific" world in which government must work with their local economy's strengths and weaknesses. This unique positioning – on the boundary between the diverse global economy and the realities of the local economy – drives state economic development efforts.

The global economy is eclectic and complex. Its markets tie together diverse products in far-flung places through intricate networks of transportation, communications, and finance. The economy of a small town ultimately must obey the same laws of economics, but its structure is completely different. A local economy may be dominated by a large employer – a feedlot, a factory, a hospital, or a tourist destination – and much of the locality's activity may be tied to that facility. When the facility prospers – when it invests and expands, takes on more employees, or pays higher wages – the locality prospers. The interests of the two are not identical, but they inevitably coincide.

State economies exist on the boundary between these two worlds, and the right mix of state-level economic development policies has aspects of both as well – both the *general* application of broad, stage-setting policies, and the *specific* targeting of their local economies' competitive strengths and weaknesses. The leading participants in any state's economy are known with certainty, much like the large employer in a small town. Instead of an individual feedlot or factory, however, state economies are typically built around one or more groups of firms and closely-related industries that give each state its own distinctive competitive advantages.

Some of these groupings – sometimes referred to as "clusters" – are well-known, such as Silicon Valley, or the postwar auto industry around Detroit. Others are less well-known but still important locally, whether they're in finance, health, polymers, jewelry, mobile home-building, furniture, or any other industry or sector. These local champions attract other economic activity to them. Relevant skilled workers are attracted to these places because they find opportunities for advancement. Supplier industries want to be near their customers in order to anticipate their changing needs. Investors, from banks to venture capitalists and early-stage "angels" who back startup companies through their initial stages of development, stay abreast of industry developments, compare firms, and meet businesspeople with track records of success.

This stew of investors, firms, suppliers, and workers in close proximity leads to exchanging information and making productivity and innovation possible. Perhaps most importantly, their proximity makes it easier to start new businesses, which not only generate new jobs but also create competitive pressure on established firms and force them to stay at the cutting edge of productivity and innovation.

Thus, even after states play their central role in the 'stage-setting" policies that support economic growth and competitiveness, there is much left for them to do. The central theme of this second set of tasks is to identify state economies' competitive advantages and use the tools available to build upon them.

Making It Work

States, therefore, have two responsibilities in fostering economic development. The first is to be an active partner with the federal government in setting the stage – creating a landscape on which economic growth can take root. The second is to identify the state's competitive advantages and build a specific, targeted policy around them. These two strands come together in a variety of areas that fall within the purview of the states. Let's briefly examine three here: K-12 education, post-secondary education, and research and development.

K-12 Education

The common denominator of high-paying jobs is high-level knowledge and skills. Our nation's performance in preparing our young people for these jobs is uneven, as measured by our progress and when compared with our international peers. The task of preparing for a technological future in a global economy begins in grades K-12, as our children learn about math and science. The latest statistics from the National Assessment of Educational Progress (NAEP) showed across-the-board improvement in mathematics from 2003 to 2005 for fourth and eighth graders.[9] A higher percentage of both fourth and eighth graders were performing at or above the Basic and Proficient skill levels. However, the relative standing among international peers of U.S. fourth graders on the Trends in International Mathematics and Science Study (TIMSS) math exam declined between 1995 and 2003.[10] In addition, U.S. 15-year-olds ranked 24th out of 39 countries that participated in the 2003 Program for International Student Assessment (PISA) of students' ability to apply mathematical concepts to real-world problems.

The news for science is also mixed. Compared to the next most recent NAEP test from 2000, fourth graders improved their scores and the percentage of children testing at or above Basic and Proficient skill levels rose in 2003. However, eighth graders showed no improvement for the third assessment in a row, and the percentage of students testing at or above Basic levels also remained stagnant. The scores for twelfth graders rose slightly over their 2000 levels, but they are still behind their 1996 levels by a significant margin. U.S. eighth graders have improved in science relative to their international peers on the TIMSS between 1995 and 2003, but the scores for U.S. fourth graders on the TIMSS have declined over the same period. U.S. 15-year-olds score slightly below the average OECD score in science literacy.

States must rise to this challenge, just as they have risen to the challenge of measurement and assessment, or the need to redesign the American high school. Teaching math and science,

9. *The Nation's Report Card*, National Center for Education Statistics, U.S. Department of education.
10. *Trends in International Mathematics and Science Study*, 2003, National Center for Educational Statistics, U.S. Department of Education.

as well as technology and engineering, in our elementary and secondary schools is a vital "stage-setting" function – it allows students to acquire highly valued skills in their later education, solve problems, become innovators and experimenters, and be effective citizens of a society that will require growing awareness of scientific issues. At the state level, it has specific advantages, as building literacy and "numeracy" allow employers to avoid training costs they would otherwise have to undertake.

Post-Secondary Education

The states play a leading role in determining the character of post-secondary education, primarily through their stewardship of state universities and community colleges; here, again, the evidence is mixed. While our nation's colleges are conferring ever larger numbers of degrees to computer and information science and biology students, the number of students with degrees in mathematics, the physical sciences, or engineering is significantly lower than it was 20 years ago. The number of Ph.D.s in these areas has improved, but now 55 percent of new engineering Ph.D.s and 38 percent of new physical science Ph.D.s go to foreign students on temporary visas.[11] Similarly, the last four years have seen resurgence in the number of B.A.s issued in math and science-related fields, led by computer and information sciences, and mathematics and statistics degrees. Taken out over 10 years, however, only degrees in computer and information sciences have grown significantly faster than the rate of growth for all degrees, and the number of degrees in engineering, mathematics, and the physical sciences have all declined.

Beyond improving their post-secondary institutions' production of math and science related degrees, states have the opportunity to make them relevant to the clusters inside their boundaries. The state university and community college institutions can work with leading firms and industries to define the skills necessary to maintain the cluster's competitiveness. Community colleges, in particular, are ideally situated to focus on the disciplines and skills needed by large and growing employers. Regular interplay between the post-secondary education school system and the state's strongest business sectors also allow the two institutions to get to know each other, allowing firms to recruit personnel and the schools to place their students.

The nation's post-secondary system is confronted with an even broader, longer-term question. The American higher education system has been a centerpiece of the U.S. economy, producing much of the nation's innovative talent – scientists, engineers, technicians, and managers – and the majority of its publicly funded research. Over the past several years, however, other nations and regions have entered the global marketplace by successfully duplicating and even improving upon this model. Moreover, American universities are now racing against each other to enter foreign markets by locating branches abroad, rather than bringing students to the U.S.

All of these trends require that we rethink the role of higher education. The goals of higher education have always been to produce individuals with the tools for social, business, and cultural citizenship and leadership. But these concepts are changing rapidly. Entrepreneurship

11. *Digest of Education Statistics,* 2005, National Center for Education Statistics, U.S. Department of Education

and the capacity to imagine the unseen and unknown are now more highly valued. The ways in which people solve problems have changed, as well, as computing automates analytic work and places a greater premium on the ability to harness facts using judgment, intuition, and creativity. Integrating diverse subject matter is as important as mastering individual subjects. The ability to work in groups and teams, often with people who are spatially and culturally disparate and are linked only by networks, is a vital, modern skill. How will we use our colleges and universities to develop citizens and leaders of the emerging century, and build an economic base relevant to the interrelated challenges of globalization and technological progress? How does the university system relate to the challenge of innovation and entrepreneurship? The answers to these questions are not obvious, but it will be up to this generation of governors to rethink the role of higher education: what are the new models that will carry our country to the next level of innovation and prosperity?

Research, Development, and Building Businesses

The federal government is the key public sector funder of research and development, but, again, states can play a central role. Federal research is generally "basic" – the kind of scientific work that underpins subsequent discoveries – as opposed to "applied," which extends those findings into areas in which they are relevant to solving day-to-day business problems. In fact, the funding of basic research has risen gradually as a share of the economy for decades, while federal applied research efforts have remained roughly constant.

Applied research and development involves specific industrial targets and, for that reason, states are ideally suited to target and support it. Some of them are starting to do so. Moreover, these states are linking their R&D support to new business creation and promotion within their boundaries. In 2004, California voters authorized the creation of the California Institute for Regenerative Medicine (CIRM) and provided the Institute with the power to issue up to $3 billion in bonds over the next 10 years. CIRM's main purpose is to provide grants and loans to public and private organizations throughout the state to support stem cell research. California, through CIRM, also retains a portion of the licensing rights for any commercial product developed by utilization of a CIRM grant as a condition of the grant. Other states, such as Connecticut, Ohio, and Wisconsin have also funded stem cell research.

Michigan developed its SmartZones initiative in 2000 to approach this issue from a different direction. The SmartZones are 10 partnerships among municipalities, local business interests, and institutes of higher education seeking to spur innovation in their regions.

Each of the 10 sites has a dedicated research purpose. For example, the Kalamazoo SmartZone focuses on drug discovery. In 2002, an acquisition led to the layoff approximately 800 scientists in the Kalamazoo area. Some of the laid off scientists entered the Kalamazoo SmartZone to form their own enterprises. Today, those numbers account for almost 30 technology companies employing almost 500 people.

Overall, the state of Michigan estimates that the 10 SmartZone sites have combined to retain over 3000 jobs in the state, and created over 3300 more. Aside from the state

government's initial investment of $25 million for startup costs, funding for the SmartZones has come from local governments, which are then leveraged to attract funds from other local institutions, both private and public. In total, the SmartZones have accumulated over $400 million in investment.

A final example is Ohio's Third Frontier Project, a 10-year, $1.6 billion initiative designed to build world-class research capacity, support early stage capital formation leading to the development of new products, and finance advanced manufacturing technologies to improve productivity in existing industries. Grants from the Third Frontier Project allow higher education, non-profit research groups and Ohio companies to speed the commercial development of products resulting from research conducted in the state. Estimates from the Third Frontier Project indicate that almost 2000 jobs have been created in Ohio as of the end of 2005. The average salary of these positions is almost $75,000.

A common denominator of these programs, beyond their focus on innovation, is their emphasis on encouraging entrepreneurship and business formation. New businesses are typically the vehicles through which new ideas, new inventions, and new investment enter the local economy. Moreover, national studies have shown that a full one-third of all manufacturing jobs created in the economy occur in startups and another one-third in establishments that grow by 25 percent or more in that year.

States can spur the growth of these new startups and fast-growing companies – often referred to as "gazelles" – by having an entrepreneurial policy alongside their R&D efforts. They can provide "incubators" for new and small businesses that help them with the cost and logistics of their early stages as well as access to other resources. They can use their own funds, as do the states in these examples, or work with funding "angels" to target fast-growing new firms or startups that build on the strengths of the state's existing clusters. They can use their post-secondary education system to teach entrepreneurship, as many programs now do.

Building State Competitiveness: The Road Ahead

All of these policies rely on the willingness of states to look at their competitive strengths and weaknesses in concrete and realistic terms. This requires competence and judgment on the part of state policy makers, as well as the ability to negotiate with private parties using public standards of transparency. But states no longer have the option of providing a broad and neutral "framework" that lets the chips fall where they may – instead, they are obliged to use policy to lever the assets they already possess. And states can no longer use their public dollars in an ever-greater bidding war for ever-fewer plants or facilities. These "transplants," auctioned to the highest bidder, inevitably expand the demand for public services without building any synergies in the local economy, and often escape before their obligations are fulfilled.

This *Call to Action* points to a new and different approach – one that calls on states to strengthen the innovative process within their boundaries. The global competition unleashed by the computing and communications revolution has made every location on the globe a competitor in its own right. Paradoxically, this leveling of the global playing field has made

what happens at the state level more important, not less. Each state now has the opportunity to further its own competitive interests by working not only to set the stage for economic growth, but also to build the innovative process as it relates to that locality's individual circumstances. That is the "high road" – the road to genuine competitiveness that results from innovation and sustained productivity.

Everett Ehrlich, an economic consultant based in Washington, D.C., served as undersecretary of commerce for economic affairs from 1993 to 1997.