

THE STATE OF

HIGH TECH

# UNREALIZED POTENTIAL: HIGH TECHNOLOGY IN HAMPTON ROADS

**O**n the face of it, given our region's assets, it would seem that Hampton Roads should be a major locus of technological power and sophistication. We boast several world-class federal research facilities, are home to higher education institutions that enroll more than 80,000 students, have been named in national surveys as a Top 10 region in terms of being a good place to do business, and we are reasonably close to the halls of political power in Washington, D.C. These assets appear to constitute a superb recipe for technological progress, if not dominance.

Yet, Hampton Roads has never really made it in the realm of technology and our technological performance over the past few decades has been lackluster. **Our technological development is distinctly inferior to that of Northern Virginia and most other comparable metropolitan areas along the Atlantic Coast. Yes, Hampton Roads has tremendous potential and still possesses some unrealized opportunities to surge forward in technology-intensive markets, but it hasn't happened yet — and it may never happen.**

Let's see why. The first step is to audit our current technology assets and performance.

## Virginia as a High-Tech Leader

The Commonwealth of Virginia has established itself as a leader in high-technology industries and employment. Several independent measures place Virginia among the top five high-tech states. But this overall success has not been shared by all regions of Virginia.

In "Cyberstates 2005: A State-by-State Report of the High Technology Industry," released by the American Electronics Association (AEA) in April 2005, Virginia was ranked fifth among the states, up from sixth place in 2002. Here's why Virginia has done so well:

- 244,200 high-tech workers;
- 88 of every 1,000 private-sector workers were employed in high-tech firms in 2003, ranking Virginia second nationwide;
- High-tech workers earned an average wage of \$74,600, or 96 percent more than the average private-sector wage earner;
- High-tech payroll of \$18.2 billion in 2003, ranking Virginia fifth in the nation;
- 12,800 high-tech establishments in 2003, ranking Virginia seventh in the nation;
- High-tech exports totaling more than \$1.6 billion, or 14 percent of Virginia's exports in 2004, ranking Virginia second nationally; and
- Expenditures in research and development totaling \$5.9 billion in 2002, ranking the state 13th in the nation.

The AEA offered these additional rankings for Virginia's national industry segments:

- Second in computer systems design and related services with 98,300 jobs;
- Third in computer training employment with 1,400 jobs; and
- Fourth in engineering services employment with 43,100 jobs.

(For more information about the AEA report, visit [aeanet.org](http://aeanet.org).)

The Milken Institute, an independent economic think tank, also ranked Virginia fifth among the states in its most recent National State Technology and Science Index ("State Technology and Science Index: Enduring Lessons for the Intangible Economy," 2004, Ross DeVol and Rob Koepp). Virginia followed Massachusetts, California, Colorado and Maryland. While Maryland ranked fourth, Virginia's other neighbors did not do as well. North Carolina, often touted as a high-tech state, was ranked 10th, Tennessee was 34th and West Virginia was 46th. Georgia recently has become known for its progressive policies, but on this ranking came in 18th.

The Milken Institute rankings are based on five major factors, which are supported by 75 different measures. The factors are research and development assets, risk capital and entrepreneurial assets, human capital capacity, technology and science work force, and technology concentration and dynamism.

**Among the five factors, Virginia ranked first among the states in the technology concentration and dynamism component, which consists of 10 indicators. As explained in the study, "this composite index aims to measure the degree to which each individual state's economy is fueled by the technology sector. In essence, the composite illustrates the effectiveness of each state's entrepreneurial, governmental and policy-formulating success, or lack thereof." That is quite a compliment for the Old Dominion.**

Virginia maintained its fifth-place ranking overall in the Milken study even though it did not rank in the Top 10 in the factors of risk capital and infrastructure or human capital capacity. These factors deserve careful monitoring for considering future economic development, and they require a close look as the regions of the state are examined.

The Milken report offers some advice in interpreting the index:

*Just as a high ranking should not be interpreted to mean that a state should be complacent about its competitive position, a lower ranking similarly should not be taken to mean that a state is consigned to a fate of underperformance. Virginia, though not a part of the Deep South, is geographically a southern state. Its rise to high-tech economic dynamism over recent years can offer lessons for states that aspire to a more prosperous future in the intangible economy.*

**TABLE 1  
TECHNOLOGY AND SCIENCE  
RANKING FOR SELECTED STATES**

Massachusetts	1
California	2
Colorado	3
Maryland	4
Virginia	5
North Carolina	10
Georgia	18
Tennessee	34
West Virginia	46

Source: Milken Institute, 2004

**TABLE 2  
VIRGINIA'S RANKING AMONG THE  
STATES ON MAJOR MEASURES OF  
TECHNOLOGY AND SCIENCE, 2004**

Overall Ranking	5
Research and Development	10
Risk Capital and Infrastructure	15
Human Capital Investment	14
Technology and Science Work Force	4
Technology Concentration	1

Source: Milken Institute, 2004

As we review the rankings of the regions of Virginia, this advice from the Milken Institute should be kept in mind, for it may apply to regions as well as to states.

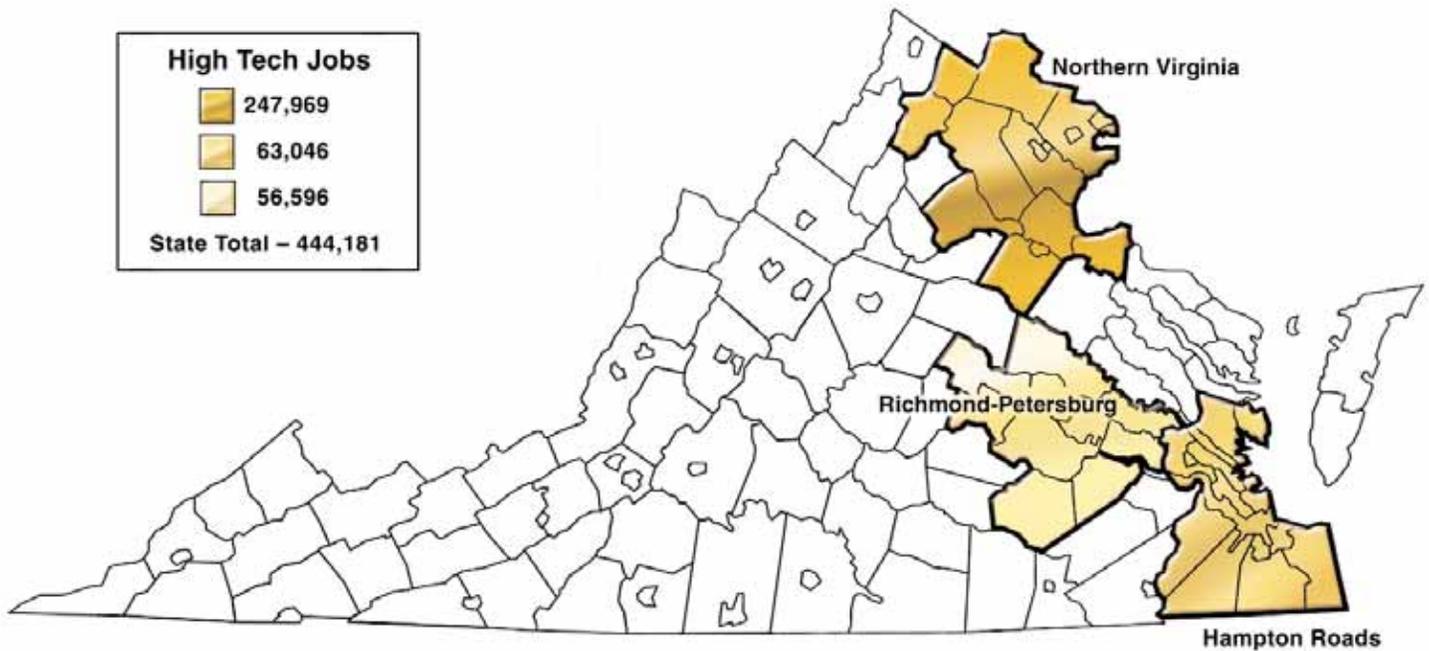
## Comparing High Tech in Hampton Roads to Other Regions

While technology shines brightly in the Northern Virginia suburbs, it diminishes in luster in Richmond and in Hampton Roads. Hampton Roads registers a distant second to Northern Virginia in high-technology companies, employment and investments. Northern Virginia is so far ahead as to make comparisons appear skewed, but the metropolitan areas of the Commonwealth's "Golden Crescent" (see Graph 1) are compared to each other here so that we might come to grips with the unrealized potential of our region.

Table 3 reports the growth of high-tech firms in Virginia from 1994 to 2004.

**GRAPH 1**

### Virginia's Golden Crescent



Alas, Table 3 also demonstrates that the degree of technological imbalance in Virginia actually increased between 1994 and 2004. **Hampton Roads (and for that matter, Richmond) are farther away from Northern Virginia now than we were 10 years ago, at least where the number of high-technology firms is concerned. Only Charlottesville and Blacksburg, the homes of the Commonwealth's two largest research universities, came close to Northern Virginia's percentage of growth. This underlines what is by now a well-established truth: one of the royal roads to technological progress is the presence of a large research-oriented university that offers work through the doctorate in most science and engineering disciplines.** Such institutions generate technological progress by their invention and innovation, and they capitalize on technological assets that may already be present nearby.

**TABLE 3  
HIGH-TECH FIRMS IN VIRGINIA 1994 to 2004**

<b>Metro Areas</b>	<b>1994</b>	<b>2004</b>	<b>Percentage Increase</b>
Bristol	90	125	39%
Blacksburg	174	290	67%
Danville	76	95	25%
Roanoke	450	645	43%
Lynchburg	12	16	33%
Harrisonburg	118	153	30%
Charlottesville	358	601	68%
Richmond	1,910	2,882	51%
Northern Virginia	6,919	11,829	71%
Hampton Roads	1,694	2,630	55%

Source: Chmura Economics and Analytics

The truth is that Hampton Roads does not have a large, research-intensive university. Old Dominion University is the most logical candidate to occupy that role by virtue of its mission and background, but the presence of several other state universities in the region, the paucity of state funding and fragmented leadership have prevented that from occurring. Were all of the research institutions (including Eastern Virginia Medical School) in Hampton Roads united to form a single entity, they would constitute a competitive entrant into the research arena that might rival Virginia Commonwealth University. **One can only muse about what might have been the case in Hampton Roads had its higher education complex grown up in the same fashion that George Mason University now is doing in Northern Virginia. There, regional legislators recognize that GMU is their primary ticket to higher education and technological progress, and they support it accordingly. There are no other major state university competitors in that region and George Mason now has added nearly every major academic program except a medical school. No such consensus exists in Hampton Roads.**

Table 4 reveals that the biggest contributor to Virginia's high-technology success easily is Northern Virginia. In 2004, Northern Virginia claimed 247,969 high-tech jobs, a 6.7 percent increase over the previous year. Those jobs produced more than \$5 billion in wages and salaries, for an average value per job of \$20,404. Fifty-six percent of all high-technology jobs in the state are located in Northern Virginia.

Hampton Roads claimed 63,046 high-tech jobs in the second quarter of 2004, up 3.9 percent from the previous year, according to statistics from Virginia Economic Trends, published by Chmura Economics and Analytics, an economic research firm located in Richmond. Those jobs produced

**TABLE 4  
HIGH-TECH JOBS AND WAGES AND SALARIES  
IN VIRGINIA, 2004Q2**

<b>Region</b>	<b>Jobs</b>	<b>Wages and Salaries</b>
Bristol	5,487	\$50,164,000
Charlottesville	7,862	100,240,000
Danville	1,371	11,618,000
Hampton Roads	63,046	804,175,000
Lynchburg	7,304	76,479,000
Northern Virginia	247,969	5,059,621,000
Richmond	56,596	891,832,000
Roanoke	13,724	178,621,000

Source: Chmura Economics and Analytics

approximately \$804 million in wages and salaries, up 12.4 percent from the previous year.<sup>1</sup> However, the average value of each of these jobs was only \$12,755.

The Richmond-Petersburg metropolitan statistical area (MSA) fielded 56,596 high-tech jobs during the same period, but this smaller number of jobs produced \$891.8 million in wages and salaries, for an average of more than \$20,000 per position. High-technology employment in Richmond-Petersburg was unchanged from the previous year, even though statewide high-tech employment had increased 4.2 percent.

The total magnitude of high-technology employment in the remainder of Virginia should not be discounted, but it is less than either Hampton Roads or Richmond. A considerable portion of the Commonwealth's high-technology research may be conducted in precincts such as Blacksburg and Charlottesville, but that is not where the great mass of high-tech jobs is located. More than 80 percent of these jobs are located in the Golden Crescent.

We in Hampton Roads host 14 percent of all the high-technology jobs in Virginia, though our region's population constitutes 21.4 percent of the state's population. **While Hampton Roads has the second-highest concentration of high-tech jobs in the state, there are four times as many (56 percent) high-tech jobs in Northern Virginia** (see Graph 2).

**The bottom line is that Hampton Roads is a distant second in a state that, in an overall sense, currently is doing very well in high technology. If Northern Virginia's contribution were removed from the totals, it would quickly become apparent that Virginia is not really a high-tech state, by most definitions.** We will have more to say about this, and its implications for Hampton Roads, in sections below.

## High-Technology Assets in Hampton Roads

From a distance, the profile of Hampton Roads is such that one might readily assume it would be a high-technology leader nationally. Our area contains the largest naval base in the world plus other significant defense installations, several world-class government research facilities and a rather large number of college students. In addition, our region is externally regarded as a good place to live and to do business. But our case for technology leadership is weaker than it first seems. Let's see why.

### DEFENSE

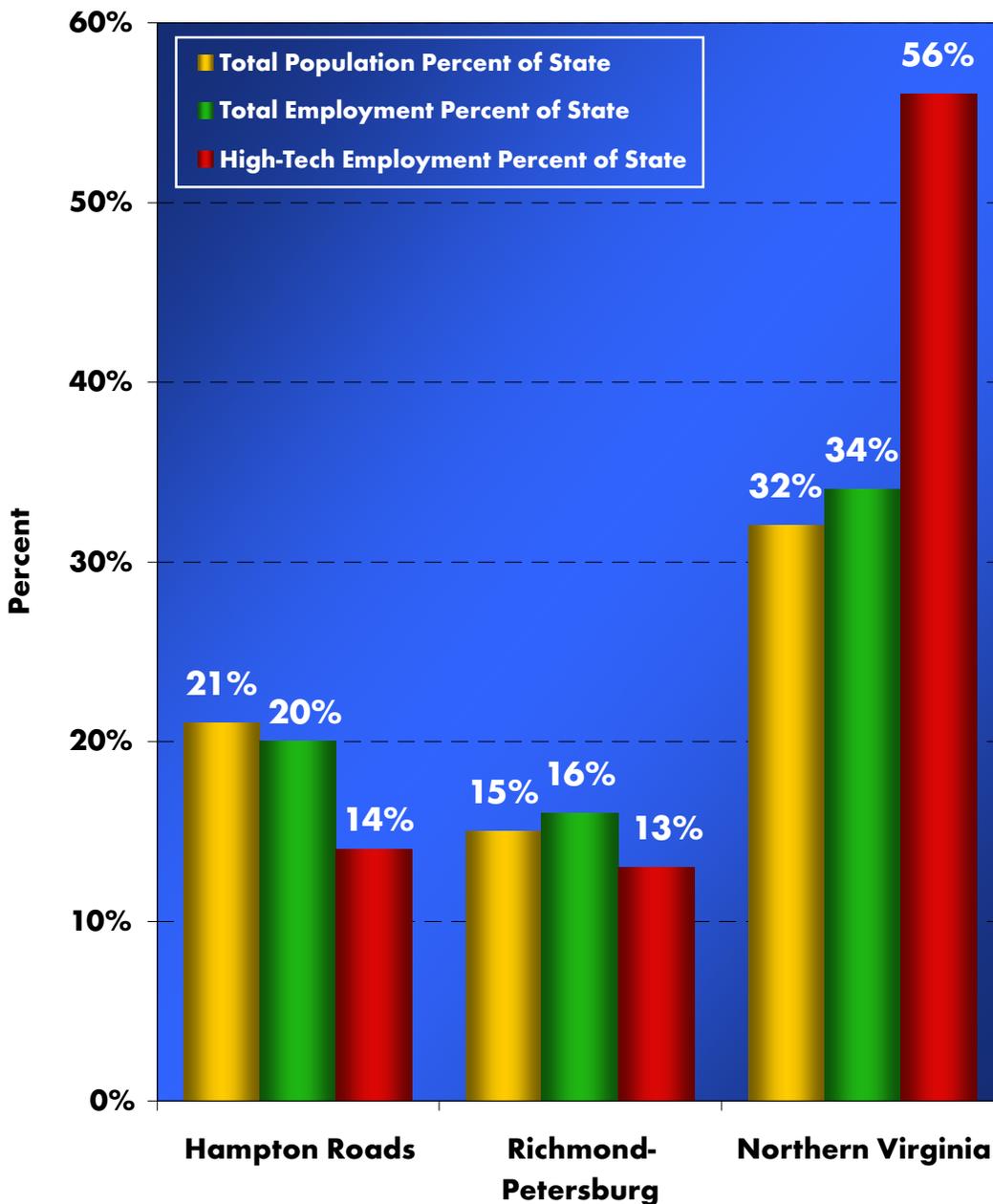
A 2004 study conducted by the Hampton Roads Planning District Commission, "The Role of the Military in the Hampton Roads Economy," found that the region ranked first among more than 300 MSAs in terms of military personnel population. We ranked eighth for the number of military personnel as a percentage of total regional employment. This is what one would expect, given that more than 36 percent of our regional economy is dependent upon defense expenditures, up from 29 percent in 2000 (see the first chapter of this report).

It is clear that defense expenditures constitute the single most important driver of the region's economy. **During the past few years, defense expenditures have been responsible for 77 percent of all economic growth in the region. While we value the jobs and the income that flow from defense expenditures, it has not escaped some observers that most of this money has not yet built a private-sector research and technology infrastructure within the region. In a phrase, the spinoff effects of defense expenditures have been relatively small.**

The federal presence in Hampton Roads that has been the most successful thus far in attracting spinoff activities has been the U.S. Joint Forces Command's **Joint Training, Analysis and Simulation Center (JTASC)** in Suffolk. All branches of the military

<sup>1</sup> Chmura Economics and Analytics uses the definition of high tech as a set of North American Industry Classification System (NAICS) codes suggested by Daniel Hecker ("Higher Technology Employment: A Broader View," Monthly Labor Review, June 1999) and updated for current industries.

**GRAPH 2  
VIRGINIA'S GOLDEN CRESCENT: COMPARISON OF  
POPULATION, EMPLOYMENT AND HIGH-TECH JOBS**



utilize modeling and simulation extensively at JTASC to develop doctrine, test and evaluate doctrine and equipment, and train military personnel. This activity has attracted a number of national corporations to the region to support the military's requirements for modeling and simulation, and it is apparent from job creation data that these firms have been in a hiring mode. In the past year, the region added almost 5,000 jobs in computer- and technology-related areas, many of which were connected to JTASC. This is the first time that such private-sector spinoff activity has occurred to any great extent within the region. Old Dominion University's **Virginia Modeling, Analysis and Simulation Center**, which is closely connected to JTASC, recently estimated generously that modeling and simulation contributes more than \$500 million to related business activity in the region.

The 2005 session of the Virginia General Assembly approved an appropriation of \$1.45 million to support Old Dominion's modeling and simulation activities connected to JTASC. The funds also include support for a new Emergency Management Training, Analysis and Simulation Center, which has a major opportunity to prosper for many years. In addition, Lockheed Martin announced in April 2005 that it would invest \$30 million for a new Center for Innovation in Suffolk. An estimated 50 technology-related jobs are associated with this investment.

**The salient question is, Will these and similar private-sector jobs remain if and when Department of Defense expenditures stagnate? If the answer is no, and private-sector modeling and simulation efforts disappear, then our region will be back at the proverbial technology starting gate. Developments thus far have been promising, but one cannot yet tell if private-sector commercialization of modeling and simulation technology is occurring, or could occur in the future. Much of the region's economic future rides on this outcome.**

There is another research and development enterprise within the region that is directly dependent upon defense expenditures, even though it is not supported by the federal government. The **Virginia Advanced Shipbuilding and Carrier Integration Center (VASCIC)** was established by the General Assembly to support Northrop Grumman's shipbuilding and repair efforts in Newport News. Northrop Grumman Newport News manages VASCIC, which is housed in a state-of-the-art facility in Newport News. There, electronic system suppliers, software suppliers, the U.S. Navy and several of Virginia's institutions of higher education work together to develop new technologies for aircraft carriers and advanced shipbuilding.

Construction on the Navy's next new aircraft carrier (CVN 21) is scheduled to begin in 2007 at an estimated cost of \$1.4 billion. Many thousands of jobs will be attached to this multiple-year process. Thus, it is apparent that VASCIC's efforts play an extremely important role in the region's economy. Still, it is not yet clear what impact VASCIC has had on Northrop Grumman, as the center's efforts have not been widely publicized.

Further, if one regional goal is to find ways to transfer military technology into the private sector and commercialize it, then candor requires us to admit that it is not a snap to find appropriate military ship technology to transfer to private boats. After World War II, technologies such as radar and ASDIC (a technology that uses sound waves to chart the ocean's bottom and to detect other boats and obstructions) had immediate applicability to the private sector. The economic equivalents have not yet been generated by recent military shipbuilding.

Taking a broader view, defense and defense-related expenditures in Hampton Roads have been substantially devoted to: (1) the jobs occupied by those who work for the Department of Defense; (2) the purchase of supplies and procurement from supplier organizations; and (3) ship repair. Needless to say, these expenditures are quite valuable to the Hampton Roads economy and, as noted, accounted for 77 percent of the region's net economic growth between 2000 and 2005. However, these expenditures rise and fall with the DOD budget and it is inevitable that defense expenditures eventually will taper off or perhaps even decline. Then what? Most of these expenditures do not leave a long-term imprint on the region's private sector sufficient to survive a reduction in defense expenditures.

If defense expenditures do taper off or decline, fewer automobiles will be sold in the region, fewer pizzas served and the sale of many other goods and services will decline. Unemployment will result and incomes will stagnate. There is no question that we would feel the adverse effects of such a development. Some defense expenditures, however, have the potential to create less ephemeral, more permanent jobs and industries. They do this by stimulating the development of firms and industries that transfer defense technology and processes to the private sector, where they are successfully commercialized. The radar and ASDIC examples cited above are illustrative.

A fair assessment is that the region's economy has not yet benefited from very many visible spinoffs that have generated new firms and industries reliant upon technologies originally developed for the Department of Defense. **One does not yet see in Hampton Roads anywhere near the number of spinoff firms that have appeared in Northern Virginia as a consequence of federal government investments in areas such as the Internet.**

No doubt it is unrealistic to expect a spinoff the size of the aircraft industry to build up in Hampton Roads as did aircraft construction and testing in Los Angeles and Seattle after World War II. Truth be told, however, there has been rather little private-sector spinoff in Hampton Roads from defense expenditures that would survive a tapering off of defense budgets. The promising recent developments around JTASC in Suffolk show great potential to reverse this judgment. Important parts of modeling and simulation technology developed for the Department of Defense also have civilian applications in areas such as transportation and medicine. It remains to be seen, however, if the corporations currently servicing JTASC will become part of a technology transfer environment that will cause them to grow permanent roots in Hampton Roads – roots that are not dependent on defense expenditures.

## WORLD-CLASS FEDERAL RESEARCH FACILITIES

The **Thomas Jefferson National Accelerator Facility (Jefferson Lab)** in Newport News is a center for basic research of the atom's nucleus at the quark level. Jefferson Lab represents an investment of \$600 million, primarily emanating from the U.S. Department of Energy. The lab is managed by a consortium of 62 universities, which are members of the Southeastern Universities Research Association (SURA).

With industry and university partners, the Jefferson Lab also conducts applied research, using its Free-Electron Lasers, which is based on technology developed in the conduct of physics experiments. Local institutions, led by Old Dominion and William and Mary, have invested considerable resources in faculty and staff positions connected to the Jefferson Lab. Frequently, these individuals work at the **Applied Research Center (ARC)** adjacent to the Newport News lab. ARC provides 122,000 square feet of offices and laboratories where university, industrial and Jefferson Lab researchers collaborate in applied research, such as the use of lasers and light as a tool in manufacturing. ARC's Free-Electron Laser Program builds on the success of the Jefferson Lab's superconducting electron-accelerating technology, but has yet to record a high-visibility success.

On the other hand, the accelerator itself at the Jefferson Lab has been a spectacular scientific success. It has delivered more polarized electrons to targets than all other electron machines combined have in their entire lifetime. In 2003, the Department of Energy named Jefferson Lab's upgrade as one of the 12 near-term priorities in its 20-year facility plan. Still, the challenge remains to privatize and commercialize elements of this science so that viable private-sector firms and jobs are created.

The same general conclusion applies to the region's two large NASA installations. Personnel at **NASA Langley** and **NASA Wallops Island** have expressed considerable interest in finding ways to transfer technology and ideas to the private sector, but a fair reading of the evidence is that successes thus far have been limited. Still, the potential for NASA to foster civilian aircraft development and production is high, as are the possibilities for NASA Wallops Island to develop a civilian spaceport.

Potential, however, is not the same as realization. **Thus far, the economic impact of the two NASA installations upon the region's technology sector has been far more limited than, say, the Internet explosion in Northern Virginia or biotechnology in the Richmond area. There has been more talk of potential than action.**

This does not exhaust the list of major research centers in the region. Worthy of note also are the **Virginia Institute of Marine Science (VIMS)**, which is a constituent element of the College of William and Mary and provides valuable research; the more than a dozen centers of excellence at Eastern Virginia Medical School, with the best known being the **Jones Institute for Reproductive Medicine**; and the many centers at Old Dominion University, including the **Center for Advanced Ship Repair and Maintenance** and the well-respected **Center for Coastal Physical Oceanography**. Hampton University also has begun to make its mark in research, though its efforts are still young. Hampton's status as a Historically Black College or University (HBCU) has resulted in significant research and development funding that eventually could lead it to become a major research institution within the Commonwealth.

## HIGHER EDUCATION INSTITUTIONS

Throughout this chapter, considerable attention has been given to the region's institutions of higher education. Every region of the United States that is growing rapidly and has a strong technology base also has at least one large research university that is a

most important part, usually the leader, of that growth dynamic. In Seattle, it is the University of Washington, which brings in about \$800 million in externally funded research annually. In Baltimore, it is Johns Hopkins University, which attracts a stupendous \$1.2 billion of research support yearly.

It is apparent that Hampton Roads, and indeed the entire Commonwealth of Virginia, falls well short here. The highest-ranking university in Virginia in terms of funded research activity is Virginia Tech (\$232 million in 2002), but it struggles to find a place among the nation's top 50 institutions in a given year. The University of Virginia typically ranks about 70th and Virginia Commonwealth University usually ranks between 90th and 100th. No institution within Hampton Roads ranks higher than 158th.

The blunt truth for Virginia is this: While the work being done by institutions such as Virginia Tech is both valuable and impressive, and we must be grateful for it, it is nonetheless dwarfed by what is going on 100 miles to the south in North Carolina's research triangle, where Duke University, the University of North Carolina at Chapel Hill and North Carolina State University each rank in the top 35 of the nation in funded research and together recorded \$1.1 billion in funding for 2002.

**If one consolidates the value of the research activity at all the universities in Hampton Roads plus Eastern Virginia Medical School, then the total is respectable — \$113 million in 2002. But even this would not place the combined enterprise in the Top 100 of the United States. We may be the 35th-largest metropolitan area in the nation, but candor requires noting that our research and development activity does not place us even close to the Top 100. This, then, is one of the critical missing engines of economic growth for our region.**

**Higher education is not the only thing needed for economic growth in Hampton Roads, but it is crucial to the growth of a high-technology economy. A set of historical circumstances and palpably unwise leadership decisions by regional leaders and legislators decades ago prevented Old Dominion University from assuming the dominant research role that doctoral public universities nearly always assume in metropolitan areas around the country. While the current assemblage of public institutions of higher education in the region offers much to commend, it is a quite ineffective structure to generate world-class research and development.**

**Further, medical and biomedical research always is one of the centerpieces of technology-driven economic development. However, Old Dominion and Eastern Virginia Medical School grew up separately. EVMS never has acquired significant public financial support and always has been something of a financial orphan. It badly needs a university connection and financial succor. Forward-thinking regional leadership decades ago should have accomplished this.**

Historically, our regional leaders — elected and unelected — chose to emphasize other developments, most of which were worthy, but retrospectively this turned out to be a less productive use of resources. It is only now, in 2005, that we recognize how costly these past decisions have become. One need only compare Virginia to North Carolina to assess the magnitude of opportunities the Commonwealth and Hampton Roads missed because of shortsighted priorities.

Even were Hampton Roads and Virginia to reverse their courses today on these matters, the impact of these changes in the short run probably would be small. At the end of the day, it takes time to develop a nationally significant research enterprise.

**Productive research enterprises take years to develop, not the least because they depend on highly talented, entrepreneurial faculty who must be recruited and retained. Research-oriented investments in an institution such as Old Dominion University must be increased continuously for decades in order for it to vault into the Top 100 public research institutions nationally, which it has proclaimed as a praiseworthy, but currently unrealistic, goal. Old Dominion and EVMS could and probably should merge, but this would require a substantial inflow of state funding, something the Commonwealth actually could now afford. Nonetheless, this is a development that might well outpace the political wills of our regional leaders and legislators.**

## GOOD PLACE TO LIVE AND TO DO BUSINESS

But all is not darkness concerning our technological development. Virginia boasts some of the best places in the country to jump-start a business or a career, according to Forbes magazine (May 23, 2005). Virginia, with three metropolitan areas, and Texas with four, were the only states to place more than one locale in the upper echelon of the 150 biggest metropolitan areas (populations over 345,000) ranked by Forbes as the “best places for business.” In the Forbes study, Northern Virginia as part of the Washington, D.C., metro area was ranked fourth, Norfolk eighth and Richmond 14th in the country as the “best places to do business.” That said, no other Virginia community made the list.

Table 5 reveals that Norfolk competed well on all of the factors Forbes considered, except educational attainment and net migration. The education criterion exposes a long-standing regional weakness. According to the 2000 census, 81.5 percent of adults over age 25 in Virginia have completed high school and 29.5 percent have earned a bachelor's degree or higher.

Hampton Roads exceeds the Commonwealth average for the percentage of adults who have completed high school (84.5 percent). However, the percentage of Hampton Roads adults who have earned a bachelor's degree or higher (23.9) is below the state average. In Richmond, 31.4 percent of adult residents have earned a baccalaureate degree or higher. Still, both metropolitan areas fall well short of Northern Virginia, where 50.7 percent of adults have earned a baccalaureate degree or above and 89.8 percent have completed high school.

As noted in previous State of the Region reports, many Hampton Roads residents leave the region to access higher education elsewhere, or they earn their degree here and subsequently depart. Why do they leave? Surveys suggest the avail-

ability of good (that is, higher-paying) jobs elsewhere is the most important reason, though a variety of other factors, ranging from our regional milieu and atmosphere (see the Richard Florida chapter) to climate, apparently also make a difference.

**TABLE 5**  
**BEST PLACES TO DO BUSINESS**  
**NATIONAL RANKINGS OF 150 AREAS**

	<b>Northern Virginia/ Washington, D.C.</b>	<b>Norfolk</b>	<b>Richmond</b>
Overall	4	8	14
Engineers	33	20	83
Cost of Doing Business	105	51	60
Cost of Living	131	65	77
Crime Rate	47	57	79
Culture and Leisure	7	45	72
Educational Attainment	2	79	29
Income Growth	16	8	16
Job Growth	20	31	51
Net Migration	35	74	54

Source: Forbes, May 2005

## Entrepreneurship and Technology

In an April 2005 report, “The Innovation-Entrepreneurship NEXUS: A National Assessment of Entrepreneurship and Regional Economic Growth,” the Small Business Administration reiterated a conclusion that by now has been put forth by dozens of studies. The SBA found empirically that both entrepreneurship (the founding of new firms) and innovation (measured by patents, R&D and high-tech industries) are vitally important indicators of regional economic growth. The SBA examined a mixture of 394 small and large regions, 10 of which were in Virginia. Virginia Beach and Newport News were included in the sample, though not Chesapeake, Norfolk, Hampton or other large cities within the region.

The SBA study developed a Regional Entrepreneurship Index, which was the average of each region's rankings in three areas: (1) the number of new firm births per 1,000 labor force; (2) the average annual change in new firm births between 1990 and 2001; and (3) the percentage of firms growing rapidly between 1991 and 1996. The region with the highest average, Glenwood Springs, Colo., was assigned an index of 100, and the relative rank of every other region was calculated as a percentage of the highest value.

The rankings for the Virginia communities and those in neighboring states are listed in Table 6. No Virginia community scored above 69.9, with Virginia Beach attaining a 52 and Newport News scoring 28.2. North Carolina had three communities above 95.9. Regions rich in entrepreneurship are high-technology regions, according to the SBA study. While it's not clear whether technology proficiency attracts entrepreneurs, or vice versa, it is apparent that the SBA entrepreneurship index functions much like a thermometer. It provides us with information about how we are doing. **It's difficult to avoid the conclusion that the SBA results reflect a mediocre or even poor performance for the Commonwealth and our region. Once again, for Hampton Roads, the absence of a large research university and a prosperous medical school appears to be causal, for numerous studies have demonstrated that such organizations stimulate entrepreneurship and innovation.**

## Summing it up

**There are many arenas in which our region excels. One need only peruse Sperling and Sander's "Cities Ranked and Rated," as we did in the 2004 State of the Region report, to see that we fare quite well compared to other regions when the subject is cultural assets, climate or air quality. We do not measure up, however, when the subject is technology. We are technologically primitive compared to Northern Virginia and most comparable regions in the country. Hampton Roads may constitute the 35th-largest metropolitan area in the country in terms of population, but is not near the Top 100 in terms of most measures of technology.**

One might be tempted to utter, "Well, that's the breaks. So what?" The "so what" of the matter is the vast impact of technology on modern economic growth. Technological competence produces economic growth and higher living standards. The region's economy currently is riding high because of expanding defense expenditures, not because of a burgeoning private sector. Should defense expenditures decelerate and stagnate, we are in for trouble, economically speaking. The absence of both an extensive private-sector technology base and a Top 100 higher education/medical research complex within the region will continue to punish us in the form of very low rates of economic growth, higher rates of unemployment and constant, or even declining, inflation-adjusted incomes.

**The "technology situation" in Hampton Roads (if we can pull together everything in this chapter under this label) is in many ways similar to our transportation situation. Action to improve our circumstances in either area will**

**TABLE 6  
RANKINGS OF REGIONAL  
ENTREPRENEURSHIP ACTIVITY**

<b>Region</b>	<b>Index Ranking</b>
Wilmington, NC	98.9
Charlotte, NC	96.4
Raleigh, NC	95.9
Asheville, NC	92.3
Greenville, SC	84.4
Hickory, NC	83.4
Macon, GA	79.3
Wilmington, DE	77.8
Richmond, VA	69.9
Arlington, VA	67.9
Columbia, SC	66.1
Roanoke, VA	63.3
Rocky Mount, NC	60.8
Winston-Salem, NC	60.0
Charlottesville, VA	55.4
Virginia Beach, VA	52.9
Lynchburg, VA	48.6
Harrisonburg, VA	30.0
Galax, VA	29.0
Newport News, VA	28.2
Staunton, VA	12.7

take many decades before we see the benefits. Just as the gestation period for a new bridge-tunnel across the James River ("the third crossing") may take 15 to 20 years, so also changing our regional technology position for the better might take as much time. Unfortunately, in the short-run we are destined to pay the costs of our past inaction and unwise decisions concerning technology and education. As Nobel laureate Milton Friedman once famously pointed out, there is no such thing as a free lunch. We figuratively ate our lunch between 1960 and 2000 and now, it appears, are destined to go hungry.

