
GREATER PHILADELPHIA'S KNOWLEDGE INDUSTRY

Leveraging the Region's Colleges and Universities in
the New Economy

Prepared by the Pennsylvania Economy League – Eastern Division

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On behalf of the project's sponsors, I am pleased to present a collection of reports on *Greater Philadelphia's Knowledge Industry*. Our purpose in undertaking this project was to profile the region's colleges and universities, with the goal of gaining a better understanding of this important regional asset and how it contributes to Greater Philadelphia's economic competitiveness. This goal has led to numerous recommendations for strengthening our knowledge industry, including specific strategies that aim to forge stronger ties between our colleges and universities and the regional economy. The ultimate success of this project, however, will be measured by the report's ability to bring together the region's academic, business, civic, and political communities under a shared vision for our region's future.

In completing this project, we have collected a significant amount of data to profile and benchmark Greater Philadelphia's knowledge industry, allowing for regional comparisons that form an important backdrop describing the global competitive environment. Much of this data was obtained from the National Center for Education Statistics (NCES), which maintains a wealth of data on higher education institutions throughout the country in the Integrated Post-Secondary Education Data System (IPEDS). As you will see, the NCES/IPEDS data set forms the backbone of our research. Many colleges and universities in the Philadelphia region also willingly provided data and insight during the research process, an invaluable complement to the NCES/IPEDS data set. Qualitative insight was gathered from notable sources on higher education, in particular the *Chronicle of Higher Education*, the *Philadelphia Inquirer* and the *Philadelphia Daily News* (for local higher education insight), and various academic publications in the fields of public policy, economics, and higher education administration. Finally, a number of individuals representing the academic, business, and civic sectors in the region previewed the draft research findings, providing important feedback on content and presentation.

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- More than 60 academic, civic, and business leaders in the region took time to preview the draft research findings, providing valuable feedback on content and presentation.
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The research presented in these reports represents the collective work of PEL Research Associates Annette Goldberg and Ernie Wright, under the guidance of Executive Director David Thornburgh and Deputy Director and Research Director Steve Wray and with the assistance of Research Associate Andrew Maleson and former Research Associate Anuj Gupta. A copy of the report is available on our website: www.peleast.org. We invite your thoughts on this research – please e-mail, call, or write us with your comments.

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GREATER PHILADELPHIA'S KNOWLEDGE INDUSTRY

Never before has the academic mission of colleges and universities – to generate and impart knowledge – been so fundamentally tied to regional economic success. With the emergence of the new economy, ideas and knowledge are becoming businesses' competitive advantage as traditional business costs are being driven down by technological breakthroughs. Colleges and universities are truly becoming the *knowledge industry* because their primary output is both knowledge and knowledge workers. Understanding the individual and collective nature of our institutions as well as the industry's ties to the regional economy is an important first step in capitalizing on this vital regional asset, especially in the context of comparatively weaker performance of the regional economy.

For years, the Philadelphia region's higher education assets have been touted as leading factors in the future economic success of the region. Yet the region's economic and demographic statistics are disconnected from what should be an important regional advantage. Despite the number of students graduating from the region's colleges and universities, the region is aging and its educational attainment levels are surprisingly low. The region's economy has not seen the growth in new business starts or employment growth that has been characteristic in other knowledge regions, particularly in the booming information technology fields. The question lingers: With its base of educational assets, why has the region underperformed the leaders in these crucial measures of economic competitiveness?

Greater Philadelphia's Knowledge Industry

Greater Philadelphia's 83-institution knowledge industry represents a diverse and accomplished set of colleges and universities. The distribution of the knowledge industry bucks general demographic trends in the region. While much of the region's population and employment base has shifted outward from the city to suburban communities, 40 percent of the student population in the CMSA¹ remains in the city of Philadelphia.

The industry is a major economic player in the region with combined annual spending of \$6.4 billion. The

largest institutions dominate the industry, with the top four accounting for more than 50 percent of expenditures. As other industries have restructured, our colleges and universities – essentially place-based institutions – have emerged as major regional employers. They stand out as a growth industry and are believed to be the region's top "exporting" industry.

Looking beyond the confines of the metropolitan region, Greater Philadelphia's colleges and universities are at the heart of an extended knowledge region that stretches along the entire East Coast from Boston to the Washington metropolitan area. The northeastern corridor of the Boston, New York, Philadelphia, and Baltimore-Washington regions accounts for four of the seven largest knowledge regions in the country, with over 1.45 million full-time equivalent (FTE) students and nearly \$5.2 billion in R&D expenditures.

Industry Contributions to Regional Economic Competitiveness

The region's knowledge industry boosts regional economic competitiveness beyond traditional notions of economic contributions by:

Attracting People to the Region – With FTE enrollment of 213,400 (296,000 full- and part-time students) and 27,000 faculty, Greater Philadelphia's knowledge industry ranks seventh in the country in FTEs. An estimated one-quarter of newly enrolled students (between 18,000 and 19,000) come from outside the region for school each year. In terms of newly enrolled freshmen, there is an estimated net gain of 3,000 college-bound individuals to the region (comparing total new enrollment with regional high school seniors planning to go to college). National rankings of our institutions collectively rank the region 8th in the country, with the region's reputation largely resting on the shoulders of the University of Pennsylvania and a set of premier liberal arts colleges and smaller universities.

Creating Access to an Educated and Skilled Worker Pool – Every year more than 51,000 degrees are conferred by Greater Philadelphia's colleges and universities, introducing new knowledge and skills into the potential worker pool. Business, liberal arts,

and other broad-based fields of study are the most popular majors of regional graduates at almost all levels of study. Regional economic clusters of professional and data-intensive services benefit from the pool of potential worker candidates who graduate from these programs. The region is particularly strong in awarding first professional degrees (law and medicine). As might be expected with the region's long history of medical leadership, degrees awarded at all levels (except PhDs) for health-related professions are another strength of regional institutions. Our strength in producing health professionals is reflected in a strong regional economic cluster of health care services and products.

Generating Innovation – A core group of universities in the region spent almost \$666 million in research and development in 1998 (R&D). Research in Greater Philadelphia is dominated by life and biological sciences. While these fields dominate research funding everywhere, the region has no other science or engineering research strength. This differs from competitor regions, such as engineering in Raleigh-Durham and computer and physical sciences in Silicon Valley. Our research universities have a young but growing capacity to transfer their findings into the commercial world (i.e., tech transfer). In 1998 regional universities struck 141 licensing agreements, the 7th largest number in the country. Many of these agreements were made with start-up and small companies that have high-growth potential.

In the new economy, these contributions are crucial to building and sustaining a thriving, innovative regional economy. Those regions that do a better job of filling the talent pipeline, generating new ideas, and connecting them to their economic fortunes will become magnets for investment, stimulating new company formation, and creating a cycle of activity that brings in young people and keeps talent here.

The Knowledge Industry in Action

In very specific instances, Greater Philadelphia's competitive advantages are directly related to our knowledge industry's core competencies. In a very real sense, the region's strengths in these industries and any resulting economic growth (current and future) are largely due to the core competencies of our colleges and universities in the corresponding fields of study. Three industry clusters in particular have especially strong ties to our knowledge industry's core competencies.

Hospitality and Tourism

For the past decade the Greater Philadelphia region has invested heavily in a multi-dimensional economic development strategy promoting hospitality and tourism in the region. This strategy rests on a solid foundation of existing amenities and assets, particularly a wealth of historical and cultural attractions.

Amidst all the discussion of strengthening hospitality and tourism in the region is an overlooked (or perhaps underpromoted) regional competitive advantage – a set of higher education institutions offering numerous distinguished programs in the visual and performing arts. The strength of these programs attracts students to the region, and their comparatively large enrollment (6th largest in the nation) results in a readily available, steady supply of cultural talent in the region. The physical presence of many of these institutions in close proximity to key tourist attractions makes them an integral part of promoting the region as a tourist destination.

While the full effect of regional investments and efforts in hospitality and tourism have yet to be realized, there is growing evidence that they are beginning to pay off – regional employment in the hospitality industry is growing, high-profile events such as the 2000 Republican National Convention are being brought to town, and industries that are related to the arts are starting to emerge and grow, such as film production and new media.

Professional and Business Services

In a world where first-mover advantage can often determine the difference between market leader and bankruptcy, having skilled professionals – accountants, lawyers, consultants, programmers, advertisers, and others professionals – who are able to advise local startups on growth strategies and more established firms with adaptive strategies is crucial.

Fortunately, Greater Philadelphia's colleges and universities produce a substantial supply of graduates who have acquired professional skills that assist all kinds of businesses in adapting to the new economy. Almost 15,000 or about 30 percent of all graduates in 1996-97 earned degrees in fields of study that support the business world.² Our institutions' individual and collective strength in producing graduates equipped with business skills is reflected in (if not a reason for) the high level of professional services employment in the region, which have experienced significant growth in recent years. VerticalNet, a regional company that operates on-line business-to-business (B2B) sites for targeted industries, is a real-world

example of how companies benefit from this regional strength – VerticalNet believes it will be able to fill 1,000 newly created positions with the company – web designers, computer engineers, and customer-support staff with average starting salaries of \$55,000 – over the next year by tapping into the pool of talent graduating from regional universities.

Life Sciences

The ties between Greater Philadelphia's knowledge industry and life sciences industries is evident in the strong presence of pharmaceutical companies and health care services (hospitals, physician practices, outpatient care facilities) in the region. The region's colleges and universities directly contribute to the strength of these industries – thousands of graduates from life sciences majors fill positions in these industries, and university research (74 percent of regional R&D expenditures go to the life sciences) fuels the growth of new and existing companies as biology-based innovation is incorporated into the commercial world.

Competing as a Knowledge Region

Despite Greater Philadelphia's historic leadership in higher education, regional comparisons of higher education assets put it clearly in a second tier of leading knowledge regions in the US. Centers of the New Economy such as Boston, the San Francisco Bay Area and Raleigh-Durham are clearly at the top of the class in terms of quantity and quality, while regions like Austin, Pittsburgh and San Diego are aggressively striving to climb higher. All of this says that we need to do a better job of connecting our knowledge industry to our broader economy, and making sure that we are staying competitive in a hyper-competitive climate.

Without continual investment and a more focused regional approach to growing and improving the region's knowledge industry, the risk is that the region could slip further down into the second tier – putting in jeopardy both future economic success and the reputations and caliber of its higher education institutions. The region faces a set of crucial challenges that must be addressed, if it is going to stay in the vanguard of leading knowledge regions:

- Talent attraction
- Reputation
- Innovation
- Critical mass
- Life sciences opportunity

Knowledge Industry Centers in the US

Top Tier: Boston, San Francisco Bay Area, New York, Washington/Baltimore, Raleigh-Durham

Second Tier: Los Angeles, Chicago, Philadelphia, San Diego, Seattle, Detroit

Strivers: Atlanta, Austin, Pittsburgh, Houston, Minneapolis, Denver

Talent: Our knowledge industry is big, but it could be bigger

Despite a full-time equivalent enrollment of over 213,000 students, the Philadelphia region has a ways to go in terms of being competitive with the nation's leading economic regions (and even some of its closest competitors) in terms of the size of its college student base. Currently, Philadelphia ranks seventh in the number of students in its region. Consider these facts:

- Our national share of students lags. If the region drew the same share of students as it has of the US population, we would have 20,000 more FTE students³ than we currently do.
- From the perspective of pure size, in order for the Philadelphia region to catch the next largest region in terms of student population (Washington-Baltimore), we would need to add at least 51,000 more FTE students. And to catch the region cited most often as an example of the new knowledge regions, the San Francisco Bay Area, we would need to add almost 100,000 new FTE students.
- Finally, if the Philadelphia region drew the same proportion of students as its leading competitors, we would have thousands more students than we do today. For example, if Philadelphia's concentration matched Pittsburgh's, we would have at least 20,000 more FTEs. If we met Denver's concentration, we would have almost 50,000 more FTEs. And to catch Boston's concentration, the region would need over 60,000 more FTEs.

Having a knowledge region befitting our size is not just a matter of competing with other large metropolitan areas, but a key requirement for success in the new economy. Richard Florida, Carnegie Mellon University professor of regional economic development, explains how regions must leverage the talent of universities in the following statement: "Over time, any university or region must be

constantly repopulated with new talent. More so than industrial economies, leading universities and labor markets for knowledge workers are distinguished by high degrees of 'churning.' What matters is the ability to replenish the talent stock. This is particularly true in advanced scientific and technical fields where learned skills (such as engineering degrees) tend to depreciate rather quickly."⁴

The region's undersized student population is already reflected in troubling signs of the pool of educated and skilled workers we offer to regional employers. According to estimates of the region's educated and skilled worker population, only 40 percent of Greater Philadelphia's working-age population (i.e., ages 16 to 64 years) has a college degree or are presently in college, compared with 60 percent in the Raleigh-Durham MSA. These estimates suggest that the regional economy could be reaping greater gains if a larger student population was present for employers to draw upon.

National reputation: Our knowledge industry reputation is good, but not good enough

In an index compiled by PEL, the region ranks 8th for the quality of institutions and academic programs as ranked by *U.S. News and World Report* in 2000. While on the surface this appears to leave the region in good standing, there is a large gap between the top-ranking regions and Greater Philadelphia. The common element of the seven top-ranking regions is the presence of: 1) at least one institution (if not two) that is nationally recognized at the undergraduate level and for all three major areas of graduate study (law, medicine, and business); and, 2) at least one other institution that is nationally recognized at the undergraduate level and for at least one of the three major areas of graduate study.⁵

After this top tier of regions begins another group that is nationally recognized at the graduate and undergraduate level, though this recognition is

usually the distinction of only one institution in the region or is the combination of lower rankings of several less prominent institutions. This group includes the Philadelphia region, where the University of Pennsylvania is nationally recognized for overall undergraduate education as well as the three major areas of graduate studies in law, medicine, and business. No other institution in the region shares this distinction. The only other institutions that make a showing in the rankings were placed in the 2nd or 3rd tiers of the *U.S. News* rankings, were high ranking regional universities, or were recognized as high-caliber liberal arts colleges (which have small student bodies).

Idea generation: Growing research capacity, but need diversification

The region also lags in research capacity. While nearly \$666 million in R&D spending is a significant amount and ranks the region 7th nationally, there is a large gap between Greater Philadelphia and those it trails. It would take over \$100 million dollars to catch number 6 (Raleigh-Durham), \$490 million to overtake number 5 (Los Angeles), and over half a billion dollars to pass number 4 (Boston). As with the *U.S. News* rankings, the region's research capacity rests largely on the shoulders of the University of Pennsylvania, whose spending accounts for 50 percent of overall regional R&D expenditures. In the leading regions, research activities are often driven by several institutions of similar size and quality (most of which were placed at the top by the *U.S. News* rankings).

What is keeping the academic and research reputation of Greater Philadelphia's knowledge industry from being recognized among the best regions in the country? Regional comparisons of colleges and universities suggest several reasons why this might be the case:

Total Regional FTE Enrollment	
1.	New York CMSA (703,800)
2.	Los Angeles CMSA (535,700)
3.	Chicago CMSA (321,600)
4.	San Francisco Bay Area CMSA (309,800)
5.	Boston NECMA (268,800)
6.	Washington-Baltimore CMSA (264,500)
7.	Philadelphia CMSA (213,400)
8.	Detroit CMSA (173,800)
9.	Dallas CMSA (137,700)
10.	San Diego CMSA (128,400)
Source: PEL, utilizing National Center for Education Statistics (NCES)	

Regional Student Concentration (FTE/1,000 residents)	
1.	Austin MSA (73)
2.	San Diego MSA (46)
3.	Boston NECMA (46)
4.	San Francisco Bay Area CMSA (46)
5.	Denver CMSA (44)
6.	Pittsburgh MSA (39)
7.	Seattle CSMA (37)
8.	Minn/St. Paul MSA (37)
9.	Phoenix MSA (37)
10.	Chicago CMSA (37)
12.	Philadelphia CMSA (35.6)
Source: PEL, utilizing National Center for Education Statistics and US Census data.	

Lack of Multiple Nodes of Excellence and Critical Mass – As discussed above, the Philadelphia region has only one institution of highly distinct quality in teaching *and* research, the University of Pennsylvania. In the country's top-ranking regions, there are at least two if not three institutions of Penn's caliber. In many instances these institutions have large student bodies and have affordable in-state tuition rates (e.g., University of California-Berkeley in the San Francisco metro area, University of North Carolina-Chapel Hill in Raleigh-Durham).

Comparatively Homogenous, Yet Fragmented Research Base – The vast majority of our region's research is conducted in the life sciences, particularly the applied world of the medical sciences. Given that four of our top five research institutions are or include academic health centers (Thomas Jefferson University, MCP Hahnemann University, the Hospital of the University of Pennsylvania, and the Health Sciences Center of Temple University) this preponderance of medical science research is not surprising. In fact, the similarity between research institutions suggests that they might be competing intensely for research dollars, rather than looking for areas of collaboration and cross-fertilization between a more diverse set of disciplines.

Weak Engineering Capacity – Comparatively little is being put into engineering-related research in Greater Philadelphia, which is driving much of the innovation in today's new economy. Regions with much stronger engineering-related research capacities – most notably Boston and San Francisco – are likely drawing the best and brightest in terms of students, teachers, and researchers. This trend is born out in the concentration of engineering graduates from these regions – Boston graduates 25 percent more students in engineering and San Francisco graduates 50 percent in engineering than the nation on average, while the Philadelphia engineering graduation rate is 7 percent less than the national average.

The challenge for the region is to identify the correct mix of investment and marketing that will build the region's reputation as a center of academic and research excellence.

Critical mass: We need a clearly identifiable center of business and research activity

Most regions that are nationally recognized for their leadership in knowledge industries have developed – either through market forces or as a part of a specific economic development strategy – nationally recognized centers of business and research activity. Whether it is the city of Cambridge in Massachusetts, the Research Triangle Park in Raleigh-Durham, NC, or the Stanford Research Park in Palo Alto, the close relationship between academic and business leadership are readily apparent to both residents of the region and the nation. And the leading regions are not resting. In San Francisco, the proposed Mission Bay mixed use development project has the potential of creating an entirely new community around the biotech research strengths of the University of California-San Francisco. And in Raleigh, North Carolina State University is developing its Centennial Research Campus to serve as an urban alternative to the sprawling Research Triangle Park.

Another new development has been the creation of virtual research centers, centered on a concept or specific field. In Pittsburgh and the State of Georgia, business, government and university leaders, working with the Cadence Corporation, have created prototype consortiums focused on making their regions the leaders in cutting-edge technologies. Pittsburgh's Digital Greenhouse is combining the resources of Carnegie-Mellon University, the University of Pittsburgh and Penn State University with local and national technology firms in an effort to make the region the leader in the development of system-on-a-chip technology, and Georgia's Yamacraw Alliance is undertaking a similar effort. These initiatives can be termed virtual, because unlike other research parks, their focus is not on real

Quality Rankings of US Knowledge Regions (PEL Index)	
1.	New York CMSA (236)
2.	Los Angeles CMSA (161)
3.	Boston NECMA (152)
4.	San Francisco Bay Area CMSA (127)
5.	Chicago CMSA (117)
6.	Washington-Baltimore CMSA (102)
7.	Raleigh-Durham MSA (94)
8.	Philadelphia CMSA (78)
9.	Detroit CMSA (58)
10.	Atlanta MSA (44)
Source: PEL, using US News and World Report 2001 rankings of colleges and graduate programs	

Top Regions for University R&D Spending (millions)	
1.	New York CMSA (\$1,759)
2.	Washington-Baltimore CMSA (\$1,583)
3.	San Francisco Bay Area CMSA (\$1,291)
4.	Boston NECMA (\$1,216)
5.	Los Angeles CMSA (\$1,156)
6.	Raleigh-Durham MSA (\$773)
7.	Philadelphia CMSA (\$666)
8.	Chicago CMSA (\$654)
9.	Detroit CMSA (\$645)
10.	Houston CMSA (\$644)
Source: PEL, using NSF data	

estate but on ideas and research. By letting the market dictate real estate priorities, these efforts can focus on developing new markets and technologies, rather than filling buildings.

Despite the best efforts of the leadership of the University City Science Center (the nation's first urban research park), the connections between business and academics in Greater Philadelphia have been less successful. However, with the recent efforts of the Science Center to reposition its new and existing real estate products and the ongoing economic development efforts of the University of Pennsylvania, there is an opportunity to identify University City as the research center of the mid-Atlantic region, akin to Cambridge's role as the center of New England's innovation economy. Staking out such a leadership position would benefit the entire region, as the ideas, concepts and companies spun out of University City would help position Greater Philadelphia as a leading region for technology-oriented business. Building a critical mass in University City could also serve as the model for developing similar centers of business and research in the region's other knowledge industry clusters, particularly the North Philadelphia neighborhoods surrounding Temple and La Salle Universities.

Life Sciences leadership: Best bet for Philadelphia's future

Philadelphia's best opportunity for connecting its academic strengths to future economic opportunity are in emerging life sciences industries like biotechnology, bioinformatics, and functional genomics. Much of the region's research strength is in the biological and medical sciences, which account for 74 percent of universities' R&D expenditures. Alongside these research activities is a growing capacity to transfer technology from the university laboratory into the commercial world – Greater Philadelphia institutions were issued the 5th most patents and made the 7th most agreements to license technology to companies in 1998. This university research and tech transfer capacity is a vital ingredient for sustaining and building on the region's life sciences-based industries, which include some of the world's largest pharmaceutical companies (80 percent have a presence in the region) and a growing number of entrepreneurial biotechnology firms.

Given that many experts believe biology-based innovation will soon take over engineering-based innovation as the driving force behind economic growth, the region's prospects for future economic growth could be very exciting. However, the

challenge for the region is to act fast and decisively because other states and regions have already committed to and invested heavily in economic development initiatives that aim to capitalize on biotechnology. Some recent examples of initiatives (proposed and underway) are:

North Carolina – North Carolina State University in Raleigh, has built Centennial Park, a mixed used research campus (\$340 in development to date) that is intended to rival Research Triangle Park (with potential total build-out to \$2 billion). It also has recently launched masters and doctoral degree programs in genomics. UNC-Chapel Hill has committed \$100 million to expand its genomics research capabilities. And Duke University is considering spending \$200 million on its Institute for Genome Sciences and Policy, a multi-disciplinary research center.

California – Governor Davis of California has proposed appropriating \$75 million to create "Institutes for Science and Innovation" at different campuses of the University of California system. These institutes are intended to spur on new industries in close proximity to UC's campuses. UC San Francisco is completing a new medical research center along the city's waterfront that is expected to result in significant economic impact for the city, including the creation of 10,000 to 20,000 indirect private sector jobs in support of the university's research activities.

Michigan – Michigan is undertaking a 20-year, \$1 billion initiative to cultivate large clusters of new businesses involved in bioengineering and other emerging life sciences industries. Research conducted at three institutions – Michigan State University, University of Michigan, and Wayne State University – will be the basis for this initiative.

Georgia – The Georgia Research Alliance (GRA), a consortium of the state's research institutions and private sector leaders, is leading the effort to recruit the nation's top scholars in biotech and other science and technology disciplines. In addition, the GRA is coordinating the research-related budget requests of the Alliance members, presenting a united vision and strategy to the state legislature in an effort to build the state's research and development capacity.

The list of proposals goes on and on, as shown in the following box; indeed, most states and many regions appear to be considering economic development goals that involve university research in some manner. Greater Philadelphia's challenge is to bring together the pieces that already exist and build them into something greater.

State and Regional Initiatives Linking Knowledge Industry and Economic Development

- Raleigh-Durham: NC State Centennial Campus (\$300M-\$2B); North Carolina Biotechnology Center
- San Diego: BIOCom; UC-San Diego Connect
- Detroit/Michigan: Life Sciences Corridor (\$1B)
- Pittsburgh: Digital Greenhouse (\$13.2 million state investment)
- Baltimore: Johns Hopkins Bay View Research Center
- Boston: Boston university's BioSquare project; Forest City—MIT University Park commercial development in Cambridge
- Illinois: Venture Tech proposal (\$1.9 B over 5 years)
- Austin: Microelectronics and Computer Consortium (MCC)
- Atlanta/Georgia: Industries of the Mind Initiative (Atlanta Chamber of Commerce); Georgia Research Alliance; Yamacraw Alliance
- San Francisco Bay Area: Mission Bay development (\$1B mixed-use real estate development built around relocation of UC-SF research facilities); Bay Area Sciences Infrastructure Consortium
- Scholarship Programs: California (\$1.3 B); Georgia Hope Scholarships; Massachusetts

Where should we be, and how could we get there? Strategies for making Greater Philadelphia one of the nation's leading knowledge regions

If success in the new economy will be increasingly concentrated in those regions with the right combination of smart people and good ideas, it is crucial that Greater Philadelphia be well positioned to capitalize and build upon its existing base of knowledge assets. We are starting from a good place – over the past 250 years, the Philadelphia region has built a knowledge infrastructure that is competitive with any in the world. What we now need to do is honestly evaluate our current standing, and be prepared to invest and seize opportunities in order to position the region as a leader in the 21st Century.

We will not be alone in this pursuit. Other regions and states are acting aggressively and decisively to attract research dollars, recruit eminent scholars, and connect research and talent in their higher education institutions to their local economies. It is clear that the region's knowledge industry must become bigger, better and more well known in order to position the region to capitalize on the new science-based economy. That will require a sophisticated and coordinated mix of planning, investment, and marketing that will result in a knowledge industry base that supports and generates private investment and development throughout the region.

The region stepped up to a similar challenge in the past decade. For years, Philadelphians wondered why we were not getting our share of tourism dollars. Yet when we looked honestly at our assets, we realized that we had been coasting on our historic reputation,

rather than striving to be competitive with the leaders in the industry. To some, the Civic Center was perfectly fine as a convention center facility – yet we now realize that the investment in a world-class convention center was necessary for success. When the Pew Charitable Trusts commissioned an analysis of the region's hospitality potential, it quickly became apparent that Philadelphia was slipping far behind other regions when it came to marketing and promoting our wealth of assets. Undertaking such a campaign required new thinking, planning, and significant investment of public, private, and charitable funds. However, it is now clear that the investment in and creation of the Greater Philadelphia Tourism Marketing Corporation was a key factor in the region's recent success. And finally, even as we began to appreciate the potential of our tourism industry, we realized that it would not be enough to live off of our historical assets and success stories. Major investments in the core infrastructure of the industry – hotels, the airport, new tourist attractions like Lights of Liberty, the Constitution Center, and even the Regional Performing Arts Center – were required to keep Philadelphia in the top echelon of tourist destination cities. Yet even after the success of the RNC, it is clear that we cannot rest for even a moment. It is likely that we will need to invest in an expanded convention center, just to keep up with the aggressive investments and actions of our competitors. And we will need to work harder to extend stays of visitors and to fill the rooms of our expanded hotel market.

The knowledge industry is in a similar position. For years, we have drifted along, believing that we were a national leader. Yet it is clear that we are not in the top echelon of knowledge regions with Boston, the San Francisco Bay Area, New York and Raleigh-Durham and we run the risk of being surpassed from

behind by regions like Austin, Atlanta, Seattle, Pittsburgh and San Diego. If we are to be competitive in the knowledge-based economy, the region must be ready to make the investments and commitments necessary to be competitive.

Where should we be headed? The region needs to invest in increasing both the size and quality of its knowledge industry, in order to provide both the workers and the ideas necessary for regional economic success. It must also increase the visibility and reputation of the region's knowledge industry, using sophisticated and targeted marketing campaigns to appeal to a variety of audiences, including potential students, potential researchers, potential investors, and businesses. Following are specific goals and potential strategies that could be employed to meet the challenges faced by the region.

Grow the Talent Base

Greater Philadelphia's knowledge industry is caught in the middle. While the enrollment at regional institutions seems large – over 213,000 FTE students – the region only ranks seventh in terms of total enrollment, despite being the sixth largest region in the country (in terms of population). Of perhaps even greater concern is the concentration of students among the region's population. Highly concentrated regions gain a reputation as “collegetowns” – centers of knowledge and learning where it is relatively easy for employers to identify and recruit the talent necessary to fuel growing companies. It is easy to point to small towns like State College, PA or Madison, WI where a single university dominates the economic landscape and say it will be impossible for Philadelphia to match that concentration. It should be of more concern when major metropolitan regions – places like Boston, the San Francisco Bay Area, San Diego, or Denver – have a much greater concentration of students than Philadelphia. It is no accident that these regions also appear at or near the top of most measures of high-tech activity or entrepreneurial hot spots.

Where does this lead us? If Philadelphia wants to maintain or improve its position as a knowledge region, it must increase both the number of students being educated at regional institutions and the pool of research dollars coming through regional institutions. The first step would be to bring Philadelphia's student concentration to the same ratio as its overall population – that would mean adding 20,000 more FTE students, or the equivalent of graduating 5,000 more students a year. The increase should be strategic, focusing on specifically increasing the number of students being trained in technical fields of engineering and the physical sciences, as well as

the basic life sciences where the region lags national concentrations of graduates at various levels. In addition, the gains should be at all levels – associates, bachelors, and masters degrees in all of the disciplines.

What are the benefits of expanding the student pool? Meeting the skills needs of regional technology employers. Potentially reversing the aging of the region by drawing in and keeping more young people. And increasing local and national attention on Philadelphia as a place that welcomes and encourages young people to learn, live, and work.

Potential Strategies

There are a number of ways that the region could add more college students to its population, none of which are mutually exclusive:

- **Market Philadelphia as a center of higher education to graduating high school seniors and potential graduate students, expanding the pool of potential applicants for local institutions.** This should be an opportunity to build upon the Campus Visit efforts begun in 1999 by GPTMC with a well-funded, targeted message to students in the mid-Atlantic region. In addition, international recruitment efforts should be explored, promoting Philadelphia as a city with numerous educational alternatives and options.
- **Strategically expand existing institutions with the room and inclination to grow.** Clearly, not every institution is in a position to expand, but those looking to expand should be encouraged to do so. In recent years, Temple has increased applications and acceptances significantly, as well as increasing the number of students living on campus. Campus expansion programs can be used for community revitalization in those areas where there is room for growth and development.
- **Establish a new technical, research-based state institution.** The quickest way to boost regional enrollment could be through the establishment of a brand-new institution. Around the country, former military facilities and corporate campuses are being converted in public colleges and universities. Perhaps the most prominent start-up has been the conversion of the former Fort Ord army base into the University of California—Monterrey Bay. Vacant properties with existing infrastructure, like those at the Philadelphia Navy Yard, or in some of the empowerment zone areas in

Philadelphia and Camden could be considered as new campuses of state universities or colleges.

- **Develop youth-oriented amenities to attract knowledge workers.** The appeal of the Philadelphia region particularly to young people becomes all the more important as we build and stake our claim as a premier knowledge industry location. We should not assume that traditional notions of amenities are appealing to young people. Rather, becoming known for youth-oriented activities and events – such as the X Games, which the city is presently in the final running for – are a crucial element for expanding the region's talent pool.

Grow the Idea Base

At the same time, the region's research base is a crucial element for future growth in the region as a source of new ideas for existing companies and new companies themselves. The region ranks 7th in research funding, but that research base rests disproportionately on the shoulders of the University of Pennsylvania and is heavily concentrated in the medical sciences. The leading research regions have multiple poles of institutional research strength, as well as stronger bases of research in the basic life sciences, physical sciences, computer sciences and engineering, while remaining strong in medical sciences.

The region should also be concerned about the relatively low ranking of its institutions. Whether one likes the *US News* rankings or not, it is impossible to ignore the fact that the Philadelphia region lags the national leaders in institutional and program rankings. High rankings help to attract students, faculty, and researchers (and research dollars) to the region. They also burnish the region's reputation as a center of knowledge – an important factor in the knowledge economy for attracting people with hot ideas and the money to fuel them.

What are some of the key factors in increasing both the research dollar pool and the quality rankings of institutions? One is recruiting star faculty. A number of regions have set into place strategies to actively recruit and lure star researchers and faculty to their regions to bring their research dollars, reputations, and star students with them. The region's business and civic leadership should set out to recruit a specific number of star researchers to the region – 50 over 10 years – working closely with regional institutions to endow professorships that meet specific regional research and economic development goals. With this, the region should be able to move

into the top five of regional rankings for quality of institutions and programs.

Another key factor is cooperation. In a number of regions and states, major research institutions are banding together to increase the pool of research dollars coming into a region. With coordinated approaches, involving both academic and private leadership, the regions are better able to approach government leaders with specific requests for funding, including capital requests. Philadelphia needs to ensure that it maintains its current position, and should set a goal to move into the top five regions for research funding, which would likely require doubling our R&D expenditures. This goal will challenge other institutions (or new institutions) to step up and expand their research programs to provide a counterbalance for the University of Pennsylvania.

Potential Strategies

There are a number of potential strategies for enhancing the region's reputation as a knowledge region and research base:

- **Create a research alliance of leading research institutions and private sector leaders.** There is a need for focused attention on the research needs of the region's primary research institutions. By bringing together academic and business leadership, there is an opportunity to strategically address the needs of both the region's business and academic community by working together to recruit and attract top researchers and research funding to the region. In other regions, research and business leaders go together to Washington and their state capitols to lobby for capital and research funding, providing the government leaders with an increased confidence that the needs are part of a strategic plan. The creation of an alliance also provides the ongoing capacity for the region to seek out and attract additional research institutions, whether they be government funded centers (NIH or Defense research labs or centers) or private opportunities (Wellcome Trust, Rand, or other private research facilities).
- **Build a strategic industry-academic consortium in the life sciences to help spur the creation of an industry in the region.** Following the lead of Pittsburgh's Digital Greenhouse, the region should focus on developing the life sciences equivalent, bringing together private and academic interests to push the envelope in identifying specific market niches where the region can be an international

leader. A virtual research center of this type can help to create a buzz about the region, lending credibility to marketing efforts that brand the region as a leading knowledge region.

- **Raise a pool of private funds to support the establishment of endowed chairs at regional research institutions.** The intensity of the competition for star faculty members who can improve institutional rankings and bring in research dollars is intensifying. Other regions are establishing pools of funds to attract the leading biotech and information technology experts to their region. Greater Philadelphia must be prepared to compete with other regions to both attract new brains to campuses and keep our best at home.

Build an Identity and Image for Philadelphia's Knowledge Industry

Despite concerns about size and quality, Philadelphia remains well positioned to assume a role as the research hub of the Mid-Atlantic region. Ideally situated between the international financial capitol of New York and the regulatory and governmental capitol of Washington, DC, the region should be aspiring to assume a knowledge-capitol role similar to that played by Boston in New England. Because both New York and the Washington-Baltimore areas are too big and diverse to be able to claim their areas as knowledge regions, Philadelphia has the opportunity, particularly with a life sciences focus, to claim that mantle. It is a perfect niche for Philadelphia to fill, and it helps to link the region to institutions in New York and Washington, allowing the region to play taller than it currently is while it builds a stronger critical mass of knowledge assets.

If the region is to become the knowledge capital, it also needs a clearly identifiable center of the region's knowledge industry – akin to Cambridge in Boston or the Research Triangle Park in Raleigh-Durham. These are places where knowledge and business intersect and overlap, and where it is clear that knowledge assets are primary factors for the success and growth of industry. Philadelphia's natural corollary to Cambridge is University City. University City is the home to 3 universities, five medical centers, and the University City Science Center. Yet, it has yet to become a hotbed of private activity, despite the best efforts of the Science Center over the years.

However, the opportunity is now ripe to build upon those assets and make University City the focal point of Greater Philadelphia's knowledge industry. The actions of the University City District and the

University of Pennsylvania have helped to stabilize and energize the University City community, and there are a number of key opportunities that will be emerging in the coming years that should lead to significant private interest. First, the Amtrak high-speed corridor will open, bringing both New York and Washington-Baltimore closer to University City and 30th Street Station. The Postal Service will be vacating much of its property along the Schuylkill River south of the train station, allowing for potential private development that is linked to the university-hospital research complexes. And, finally the strengthening of Center City as both a business and residential location has created opportunities for new development, which could be focused to the west, effectively linking University City and Center City as a new economy business center. This challenge would require significant leveraging of private sector investment, as seen in other regions, where private sector investment tied to university-related economic development strategies have reached a billion dollars.

Potential Strategies

Potential strategies for branding Philadelphia as a true knowledge region include:

- **Maximize research and development business opportunities in University City.** University City is the natural hub of the region's knowledge industry, and its linkages to Center City should make it a natural center for research-based business activity. Every effort should be made to utilize the Keystone Opportunity Zone incentives and other economic development programs like TIFs to build a critical mass of business and research activity in University City that crosses the river into Center City West. University City has a unique opportunity to combine elements of both Cambridge and the Research Triangle Park in an area immediately adjacent to the region's hub of business activity, with its lawyers, business consultants, accountants, and financiers.
- **Market the region as a knowledge hub.** A comprehensive regional marketing strategy should be developed that realistically highlights the region's strength as a knowledge center, while also focusing on the ongoing efforts to invest and build upon those assets. No longer is it enough to tell a story of what you have or had – it is just as important to tell the story of what you are doing to continuously improve and grow the region's knowledge base.

Why Act Now?

This story is a challenge to the region to think strategically about its future, to build upon a set of

good, but maybe not great, assets, and to dare to think big when it comes to our future. No longer is it enough to be satisfied with being good as a knowledge region. The leading regions are undertaking major initiatives designed to maintain and even surpass their current positions as the nation's leaders. Greater Philadelphia really has no choice if it wants to compete in the new knowledge-based economy. It must recognize that other regions – both ahead of and behind us – are daring to innovate and change their ways of thinking and are already acting aggressively to pursue many of the opportunities laid out here.

The pieces are in place for Philadelphia to capture its rightful place among knowledge regions:

- The state government is actively involved and interested in promoting Pennsylvania and its regions as centers of knowledge and innovation;
- Regional civic organizations and foundations are increasingly focused on capitalizing on the region's knowledge assets;
- We understand that this type of regional transformation can be done – we have learned the lessons from our hospitality industry;
- We understand that we cannot afford to wait – it is clear that the competition isn't.

¹ Defined as the Philadelphia-Wilmington-Atlantic, PA-NJ-MD-DE CMSA: Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania; Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Salem Counties in New Jersey; New Castle County in DE; and, Cecil County in MD.

² Degrees awarded in business management and administration; law; computer information sciences; and, engineering.

³ Full Time Equivalent enrollment is calculated using the standard formula used in college and university budgeting (full-time enrollment + 1/3 part-time enrollment).

⁴ Florida, Richard, "The Role of the University: Leveraging Talent, Not Technology," Issues in Science and Technology (Online), Summer 1999.

⁵ For the New York metro area, these institutions are Columbia University, New York University, Princeton University, and Yale University; for Boston, they are Harvard University and MIT; for Los Angeles, they are UCLA and USC; and for Raleigh-Durham, they are UNC-Chapel Hill and Duke University. Most of these regions also have nationally recognized 2nd-tier institutions and liberal arts colleges that round out their reputations as major centers for knowledge workers.