Baltimore Collegetown Network

www.BaltimoreCollegetown.org
1002 Dulaney Valley Road | Baltimore, MD 21204 | 410.828.5733

Economic and Community Impact Study

Member Institutions
Baltimore City Community College
Baltimore Hebrew University
College of Notre Dame of Maryland
Community College of Baltimore County
Coppin State University
Goucher College
Johns Hopkins University
Loyola College in Maryland
Maryland Institute College of Art
McDaniel College
Morgan State University
Towson University
University of Baltimore
University of Maryland, Baltimore
UMBC
Villa Julie College

Please select a section using the links below:

1. **Executive summary publication**
   The Brains Behind Baltimore: How Higher Education is Driving the Region's Economic Future

2. **Study Part One:**
   The Contribution of the Baltimore Collegetown Network on the Baltimore Region's Economy: *Richard Clinch, the Jacob France Institute at the University of Baltimore*

3. **Study Part Two:**
   A Consideration of the Impact of the Baltimore Collegetown Network: *RESI of Towson University*

Baltimore Collegetown Network

THE BRAINS BEHIND BALTIMORE

HOW HIGHER EDUCATION IS DRIVING THE REGION'S ECONOMIC FUTURE

2008 ECONOMIC AND
COMMUNITY ACTIVITY REPORT

ABOUT THE BALTIMORE COLLEGETOWN NETWORK

The Baltimore Collegetown Network is a consortium of 16 colleges and universities that works to enhance the academic, professional and social lives of Baltimore's college students, faculty and staff.

Over the last ten years, BCN has accomplished a series of successful initiatives. These include academic agreements serving thousands of students and faculty, a transportation system that shuttles 75,000 riders each year between academic and social destinations, an award-winning website that helps attract and engage students, and a marketing campaign to raise the profile of Baltimore as a college town.

BCN facilitates collaborative planning and community development to maximize academic, residential, transportation, cultural and social opportunities that raise the visibility of Baltimore as a college destination and advance the development of the region as a competitive, vibrant metropolitan region.

INTRODUCTION

The Baltimore region is competing fiercely with other metropolitan areas to build a strong economic base for the new century's global marketplace. The manufacturing-based economy in which Baltimore became prosperous is rapidly receding. The new economy, though still taking shape, appears to be built around technology and information. This is good news for Baltimore, because the region's concentration of higher education institutions is proving to be a vital economic asset.

This report summarizes the findings of a recent economic study conducted on behalf of the Baltimore Collegetown Network, a consortium of 16 colleges and universities working together to make Baltimore a better place for students, faculty and staff to live, work, play and learn. In the first part of the study, the Jacob France Institute at the University of Baltimore analyzed data to quantify the economic contributions of higher education to the regional economy. The second part of the study, by RESI of Towson University, examined how higher education, business and government collaborated to create strong research-based economies in North Carolina's Research Triangle, California's Silicon Valley and Boston's Route 128, and what lessons Baltimore might draw from those successes.

The report makes two important points. First, that **colleges and universities are a major, significant economic driver in the Baltimore regional economy.** Numbers on the order of $17 billion in impact, and 162,000 jobs, show the surprising strength of higher education.

Second, that **the region's higher education institutions are a strong competitive advantage for Baltimore in the 21st century global economy.**

The success factors in the industrial economy were location, transportation, natural resources and labor. In the new economy, Nobel Prize-winning economist Robert Lucas has argued, the primary determinant of economic growth is the clustering of human talent. Fortunately, the Baltimore area is rich in the natural resources that fuel the high-tech information economy. The region is home to hundreds of thousands of highly educated citizens who already are creating new knowledge, forming new enterprises, and providing the skilled labor for propelling and sustaining information-based businesses. Higher education institutions frequently attract talent to the area, and thousands of talented individuals stay in the area for the lifestyle and amenities available here.

Baltimore's business and political leadership, as well as the higher education sector, have work ahead of them in order to capitalize on the economic asset that higher education offers. But as the new century unfolds, Baltimore has a splendid opportunity to resume its place among the nation's economic powerhouses. This report will demonstrate the strength of Baltimore's higher education assets and suggest ways to capitalize upon them.

Kristen Campbell
Executive Director

Peter Toran
Governing Board President
Vice President for Planning, University of Baltimore

To download a complete copy of the study, please visit www.BaltimoreCollegetown.org/study.pdf

ECONOMIC AND FISCAL IMPACT

OUTPUT IMPACT

$17.226 BILLION

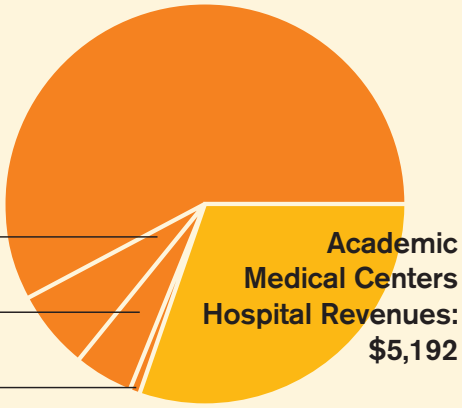
Colleges and Universities:

Total Operating Expenditures[1]: $10,017

Capital Expenditures: $1,082

Student Living Expenditures: $833

Visitor Expenditures: $103



(Direct and Indirect Impact — $Millions)
Data for Baltimore Collegetown Network comes from 15 of the 16 member institutions. Baltimore Hebrew University did not participate in the study.

(1) Less Wages and Salaries Paid to Students

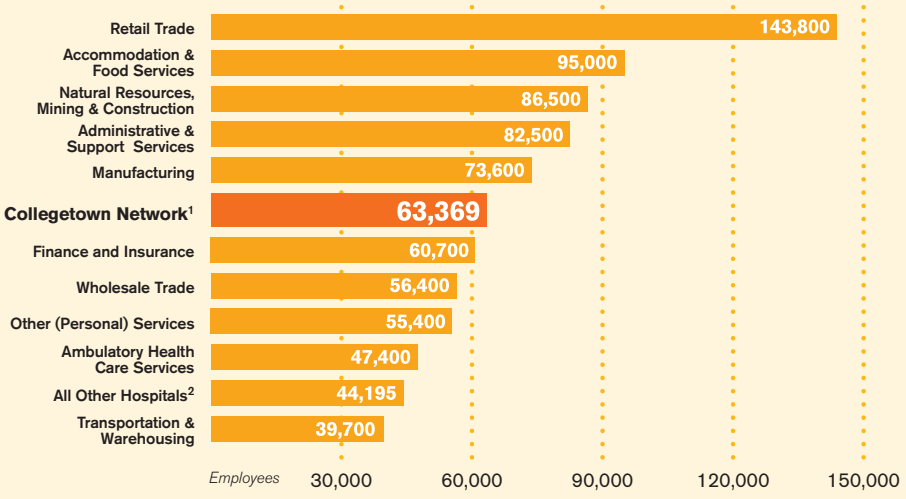
Source: Baltimore Collegetown Network (BCN) and the Jacob France Institute (JFI)

1

2

EMPLOYMENT OF BCN COMPARED TO OTHER REGIONAL INDUSTRIES

63,369 EMPLOYEES



(1) Including both BCN members and JHH and UMMC. (2) Not Including JHH and UMMC - which are included in the BCN.

Source: BCN and the Bureau of Labor and Statistics (BLS)

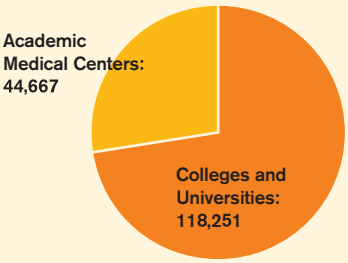
The Baltimore region's 16 colleges and universities enroll more than 120,000 students and are a familiar presence on the cityscape, as well as popular sources of interesting programs, concerts and sporting events. What may be less familiar is the powerful impact of these institutions, collectively, on the regional economy.

The colleges and universities comprising the Baltimore Collegetown Network, together with their two academic medical centers, represent a $17.2 billion economic contribution annually to the area economy (Figure 1, left). Nearly $8 billion of this figure is direct expenditures for salaries, equipment, capital expenditures and other operating expenses. Indirectly, these dollars spin off sales and jobs that create an additional $9 billion of economic activity.

The actual size of the higher education sector, in relation to other sectors, is reflected in the employment market. Collegetown members and their two affiliated teaching hospitals are the region's sixth largest employment sector (Figure 2, left). They account directly for more than 63,000 jobs and indirectly for a total 162,918 jobs. (Figure 3, right). In terms of actual payroll size, the significance is

EMPLOYMENT IMPACT

162,918 JOBS



(Direct and Indirect Impact)

Source: BCN and JFI

3

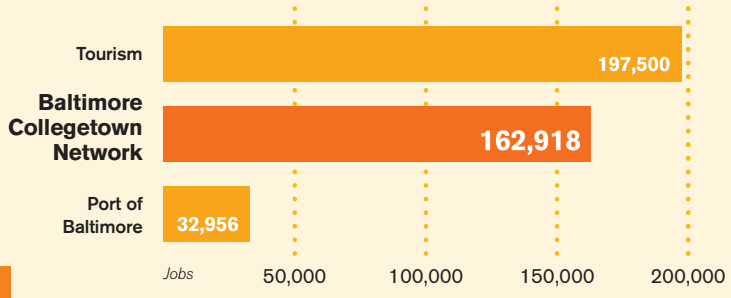
greater, because wages in higher education average $51,826 annually, well above the regional average.

Higher education compares favorably to two other prominent employment sectors in Maryland, tourism and the Port of Baltimore (Figure 4, right). Collegetown members generate more jobs than the Port. Although there are fewer higher education jobs than tourism jobs, higher education's total payroll is larger because of its higher average wages (Figure 5 and 6, right).

Another measure of economic impact is fiscal contribution to state and local government revenues. The nonprofit institutions in higher education contribute to governments through income taxes of employees and those retail sales subject to sales taxes. The direct fiscal impact on state revenues is about $136 million annually, with a total direct and indirect contribution of almost $236 million (Figure 7, page 4 top). An additional $84.5 million direct and indirect contribution goes to local government.

EMPLOYMENT FIGURES BY INDUSTRY

162,918 JOBS

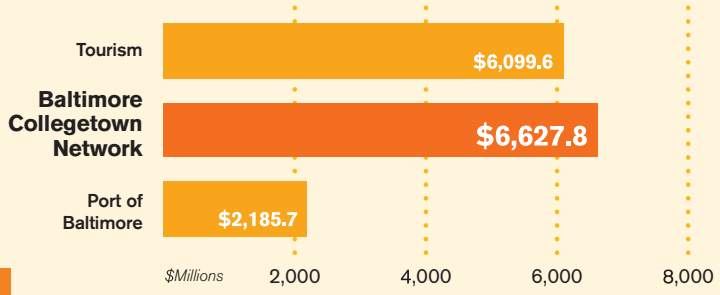


(Direct and Indirect Impact)

4

LABOR INCOME

$6,627.8 MILLION

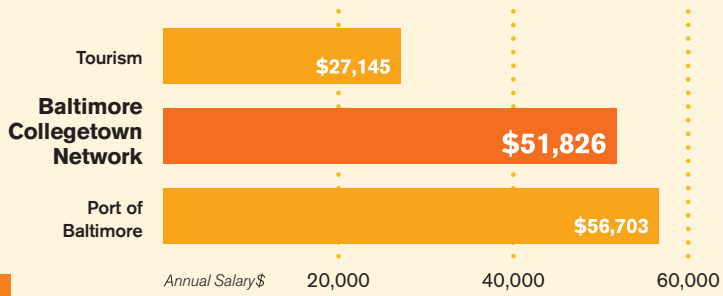


(Adjusted for Inflation: 2006 Dollars)

5

AVERAGE ANNUAL SALARIES BY INDUSTRY

AVERAGE SALARY: $51,826



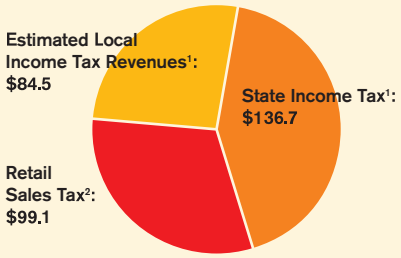
Source: RESI and JFI

6

7

FISCAL IMPACT

$235.8 MILLION IN TAX REVENUE



(Direct and Indirect Impact — $Millions)

(1) Calculated as the incremental increase in earnings multiplied by the effective state or local income tax rate.

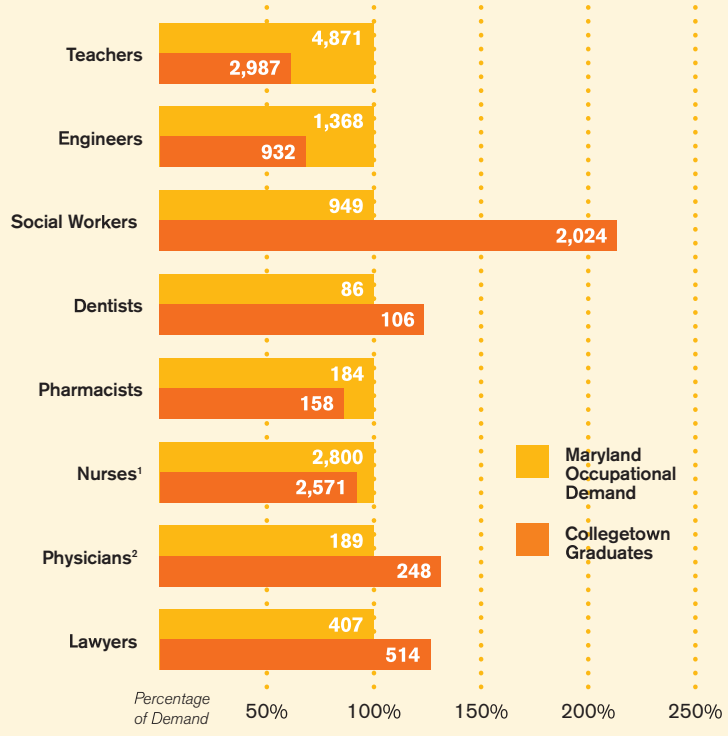
(2) An average of 29.9% of income is spent on goods subject to sales taxes calculated using Maryland's 5% sales tax rate.

Source: University of Maryland and JFI

8

COLLEGETOWN NETWORK GRADUATES AS A PERCENTAGE OF MARYLAND DEMAND

88% OF MARYLAND OCCUPATIONAL DEMAND



(1) Includes registered nurses and licensed practical nurses; (2) Includes surgeons.

Source: Maryland Department of Labor, Licensing, and Regulation

PREPARING THE WORKFORCE

One of the principal outputs of higher education is graduates prepared to enter the workforce. In providing the Baltimore region with a skilled and well-educated workforce, the area's higher education institutions deliver one of the region's core competitive advantages. (It is an advantage that the entire state enjoys. Maryland has the second-highest share of the workforce with at least a bachelor's degree, is first in the percentage of the workforce with a graduate or professional degree, and first in doctoral scientists and engineers as a percentage of total employment.)

In 2006, Collegetown members awarded 10,792 bachelor's degrees, another 7,886 master's degrees, 641 doctoral degrees and 1,026 professional degrees. The number of graduates each year trained in their respective fields is equivalent to two-thirds of the state demand for engineers, 92 percent of state demand for nurses, and 86 percent of the demand for pharmacists (Figure 8, left). Collegetown also graduates more than 100 percent of the state demand for lawyers, physicians, dentists and social workers – not all of whom remain in the region or the state.

The region's community colleges also play key roles in workforce development. In addition to providing the first two years toward a bachelor's degree for many students, they offer career training in skilled jobs that do not require bachelor's degrees, working in close partnership with local businesses. Community colleges

9

RESEARCH EXPENDITURES

Total Research Expenditures	$2.17 Billion
Federal Sponsored Expenditures	$1.73 Billion
Industry Sponsored Expenditures	$196.6 Million

PATENTING/DISCLOSURE ACTIVITY

Invention Disclosures	549
New Patent Applications Filed	451
U.S. Patents Issued	89

TECHNOLOGY TRANSFER ACTIVITY

Adjusted Gross License Income Received	$12.7 Million
License/Options Yielding Revenues	296
Licenses/Options Executed	124

(2005 Data — Includes JHU, UMB and UMBC)

Source: Association of University Technology Managers, BCN, and the JFI

have also been leaders in preparing minority students for participation in the region's high-technology, information-economy workforce.

On average, **31 percent of graduates from Collegetown institutions stay in the Baltimore area while 53 percent remain in the state.** Closer alliances between businesses and higher education institutions in such areas as curriculum, employee training and student internships could increase retention rates, while helping local enterprises lower the costs of employee recruitment.

TECHNOLOGY TRANSFER

By encouraging entrepreneurship and the commercialization of technology, higher education institutions strengthen the region's business infrastructure in ways that do not necessarily appear as hard numbers.

Proximity to university research scientists and laboratories is an important business advantage for science and technology companies, as areas such as the Research Triangle, Silicon Valley and Boston's Route 128 corridor have demonstrated. Close connections between universities and businesses can speed the conversion of research into new commercial products. Members of the Baltimore Collegetown Network spend almost $2.2 billion annually on research (Table 9, left). Most of the studies are funded by federal dollars, although industry-sponsored initiatives totaled almost $200 million in 2005.

Patent applications and invention disclosures give an indication of the extent to which commercialization of research is taking place. In 2005 BCN members filed 549 invention disclosures and 451 new patent applications and were awarded 89 new U.S. patents (Table 9, left). Revenues for licenses and options for commercial applications totaled $12.7 million (Table 9, left).

COLLEGE / TOWN CONNECTIONS

The English Language Institute at **Baltimore City Community College** offers a comprehensive language program for college-bound students that includes both academic-track instruction in reading, writing and grammar and support classes in speaking and listening, pronunciation and vocabulary. Beginner-level classes are free to any state resident.

More than 65,000 students take credit and continuing education courses each year at the **Community College of Baltimore County.** Most pursue industry-specific workforce development offerings in fields such as allied health, justice, information technology, and business. CCBC also prepares students for transfer to four-year colleges and universities.

COLLEGE / TOWN CONNECTIONS

The student-run Community Service Organization at the **College of Notre Dame** plans and coordinates opportunities for student involvement in service. Activities include a Thanksgiving dinner for senior citizens, collecting toys and Coats for Kids for holidays and shelters, and Garden Harvest, a community farm that benefits economically disadvantaged citizens.

Coppin State University operates and manages Rosemont Elementary School, a Baltimore City Public School that has progressed from a low-performing school to one boasting of the highest test averages in the city. The university also operates a high school, Coppin Academy, on its main campus, which exposes 200 students to highly specialized instruction under strict academic guidelines.

University research parks in the region provide spaces ideal for collaboration between business and higher education. Each major research university in the Baltimore region is developing a research park:

- The Science + Technology Park at Johns Hopkins is part of the New EastSide project, a planned 31-acre redevelopment effort in East Baltimore that will offer 1.1 million square feet of lab and office space, as well as new housing, a school, shops, restaurants and parking.
- BioPark at the University of Maryland, Baltimore will total 1.17 million square feet of leasable space, with a focus on harnessing and commercializing the university's bioscience research. A 2006 analysis projects businesses in the park will directly generate $841 million in annual sales and support 4,145 jobs in the city.
- bwtech@UMBC Research and Technology Park is a 41-acre park, established in 1989, with total capacity of 350,000 square feet of office and laboratory space. A 2006 study found that the park, together with a business incubator and accelerator, supports more than 800 jobs directly, and accounts for business sales of more than $200 million annually.

Together, the three parks hold the promise of securing the region's place as a bioscience and technology cluster – a geographic concentration of competing and cooperating companies and their suppliers and service providers. Clusters tend to accelerate the pace of innovation that stimulates growth and the formation of new companies.

ENTREPRENEURSHIP

Research parks tend to attract established companies with well-developed research and development operations. At the other end of the business spectrum, higher education institutions in the region are taking strong initiatives to support start-up businesses and entrepreneurship generally. A number of Collegetown members host entrepreneurship centers that offer assistance, advice and student help to small businesses. Three universities in the Baltimore region manage business incubators to nurture young start-up companies.

- The Emerging Technology Center @ Johns Hopkins Eastern is a 45,000-square-foot center in the renovated former home of Eastern High School, with a focus on commercializing innovative technology developed at Hopkins and other regional research institutions. Thirteen companies have graduated since the center opened.
- The Business Globalization Center at Towson University is a 5,100-square-foot incubator for product-oriented Maryland companies seeking international markets, as well as international companies seeking to market products in the Mid-Atlantic.
- bwtech@UMBC Incubator and Accelerator, with 165,000 square feet, is home to 34 start-up and emerging bioscience and high-technology companies. More than 30 firms have graduated since it began in 1989.

The numbers tell a story about the size and impact of the higher education sector. But they only tell part of the story. Higher education makes a significant impact on qualitative factors that have proven to be necessary prerequisites for attracting the businesses and workforces of emerging high-technology fields – the type of businesses that can ensure the region's future as a vital economic center in the 21st century. These qualitative factors are discussed in the next section.

ATTRACTING AND RETAINING TALENT

In addition to their significant economic contribution, Baltimore Collegetown Network members provide other valuable indirect contributions to the area's economic vitality. Colleges and universities make tremendous contributions to the area's high quality of life through their activities in health, elementary and secondary education, community service, entertainment and culture. These quality-of-life factors often prove decisive in attracting and retaining the talented people whose presence can propel economic growth.

10

EXPENDITURES BY CAMPUS VISITORS

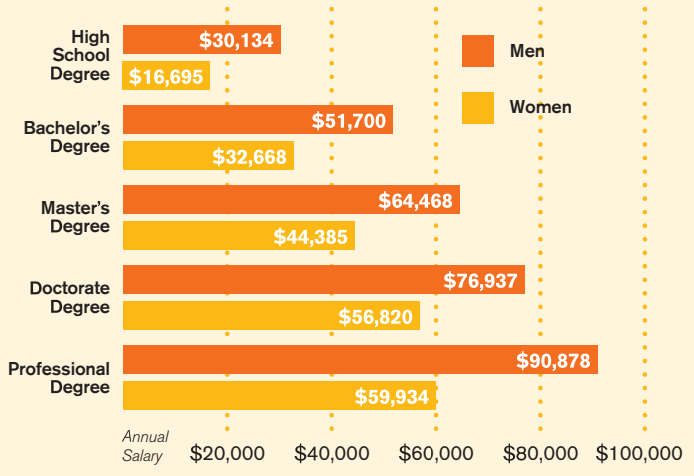
Out-of-State Visitors	300,000
Visitor Expenditures	$51.4 Million
Total Economic Contribution	$102.7 Million

Source: BCN and JFI

SUPPORT FOR ELEMENTARY AND SECONDARY EDUCATION

Members of the Baltimore Collegetown Network prepare thousands of teachers annually who work in the region's public and private schools. They also offer advanced degrees for teacher specialists and school administrators. Beyond their academic degree programs, colleges and universities engage in active partnerships with public schools to improve student performance. Programs include colleges managing public schools, university students tutoring elementary and secondary school pupils, collaborations to enhance the professional skills of teachers in mathematics and the sciences, and summer enrichment activities that teach pupils in non-classroom settings.

MEDIAN INCOME OF INDIVIDUALS BY EDUCATIONAL ATTAINMENT



Source: U.S. Census, CPS 2006 Annual Social and Economic Supplement

11

COLLEGE / TOWN CONNECTIONS

Goucher College provides a full calendar of cultural and educational programs for the region, including public readings by notable writers, public lectures by national political leaders and media luminaries, and two series of free public concerts, the Henry and Ruth Blaustein Rosenberg Lecture-Performance and the Avery Fisher Music Residency. Events bring 98,000 visitors to campus annually.

HEALTH

In addition to training thousands of professionals and technicians for the health care industry, Baltimore Collegetown Network members actively promote a variety of community health programs. In particular, several institutions support clinics that provide primary care and specialty care services for their communities.

COMMUNITY SERVICE

Giving back to the community is part of the mission of colleges and universities. Both faculty and students from Baltimore Collegetown Network institutions make valuable contributions to organizations serving the community. Most Collegetown members have organized programs that encourage student volunteerism and coordinate services to community service organizations. On a number of campuses, students serve nonprofit organizations through service-learning internships.

SPORTS AND CULTURE

Each year, Baltimore area colleges and universities enrich the region's cultural and artistic offerings with hundreds of lectures, guest speakers, concerts, plays, dance performances and special events. The diverse and bountiful cultural attractions in the Baltimore region are a major attraction for residents. College and university facilities greatly augment the number of venues available in the region for artistic and educational programming.

Sporting events at area colleges and universities also add vitality to the calendar of activities each year. The athletic facilities at these institutions greatly increase the inventory of sites available to the community for recreation activities. Many collegiate sports events draw hundreds of visitors to the area.

The **Johns Hopkins** Medical Institutions' outreach efforts in East Baltimore include the Isaiah Wellness Center for seniors, the Wald Community Nursing Center, and screenings for HIV-AIDS and breast, prostate and colorectal cancer. In addition, SALUD, operated by Hopkins nursing students, sponsors health outreach activities to the Hispanic community and provides translation and cultural competency training to healthcare providers.

McDaniel College promotes the spirit of service through Harnessing Youth's Positive Energy (HYPE), a student-led task force that coordinates service events and volunteer opportunities. Through the Best Buddies program with the Arc of Carroll County, McDaniel students are paired with area residents with development disabilities. Students make a one-year commitment to the program.

LEARNING FROM OTHER REGIONS

The Baltimore region has the potential to establish itself as a bioscience and technology cluster – a geographic concentration of competing and cooperating companies, suppliers, service providers and other institutions. Three prominent existing clusters demonstrate what clusters can achieve and suggest models the Baltimore region can follow. In each example, effective links between the academic, private and public sectors capitalized on existing research strengths and resulted not only in powerful regional economies but also in cutting-edge research and commercial products with worldwide impact.

RESEARCH TRIANGLE PARK

Research Triangle Park, a 7,000-acre site near Raleigh-Durham, North Carolina, was founded in 1956, at a time when North Carolina's manufacturing industry was stagnating. Planners in government, academia and business thought they might encourage the growth of innovative, high-skill industries by building on the research capabilities of the University of North Carolina at Chapel Hill, Duke University, and North Carolina State University. The state helped coordinate private sector and university interaction. Initial funding came from the textile industry and anonymous, private donations. To ensure the continuous support of faculty, the founders established the Research Triangle Institute, which was replaced by the Triangle Universities Center for Advanced Studies in 1974.

The project found solid footing in 1965, when both IBM and the U.S. Department of Health, Education and Welfare announced plans to build large facilities in the park. Growth accelerated in the 1980s and 1990s, aided by the state-funded North Carolina Biotechnology Center, which has invested more than $187 billion over 25 years to support and promote biotechnology in the state.

From the beginning, RTP encouraged a climate that fostered the formation of spin-off companies. Currently four incubators house 50 entrepreneurial firms, and the region also boasts the Council for Entrepreneurial Development, the nation's largest entrepreneurial support organization. One-third of the RTP tenants in 2006 were start-up companies.

In 2007 RTP had more than 39,000 employees in more than 157 organizations. Salaries average about $56,000, nearly double the average for the region. Success factors have been university strength, entrepreneurial spirit and government support. The cooperation among the academic, government and corporate spheres made the commercialization of research possible and gave businesses a reason to locate in the park. Good timing also played a role: RTP was founded when technology industries, especially in bioscience, were new, and large settings for research and development were rare.

COLLEGE / TOWN CONNECTIONS

The Center for Community Service and Justice at **Loyola College** develops programs to heighten awareness of social justice issues among the entire college community. In addition to hunger and homelessness awareness events on campus, student volunteers with Care-A-Van share food and conversation with homeless people in Baltimore.

The Community Arts Partnership program at **Maryland Institute College of Art** involves graduate students in community-based arts projects in urban neighborhoods throughout Baltimore. Projects have included murals, puppetry, video, photojournalism, costumes, animation and book-making.

COLLEGE / TOWN CONNECTIONS

The Murphy Fine Arts Center at **Morgan State University,** completed in 2001, contains four performance spaces, including the Gilliam Concert Hall, with seating for more than 2,000. The center also houses an art museum and regularly opens its doors for community concerts, exhibitions and events.

Towson University, in partnership with Baltimore City Public Schools, city government and grassroots organizations, is managing the Cherry Hill "Learning Zone," which includes six public and private K-12 schools. The partnership aims to help the community achieve its potential through community, economic and educational development.

SILICON VALLEY

The history of innovation in San Francisco Bay Area's Silicon Valley goes back almost a century. In 1912, Lee de Forest of Palo Alto, with some support from Stanford University faculty and officials, invented the vacuum tube amplifier — the foundation for radio, radar, television, computers and the electronic age. In the 1930s, Stanford Professor Frederick Terman encouraged William Hewitt and David Packard to start a company to produce their audio-oscillator. Their first customer was Walt Disney, who used the product to make *Fantasia*.

Research and development in the valley took off after World War II with massive federal funding for science and technology to compete with the Soviet Union. A disproportionate share of the research funding landed at the region's four strong research universities, Stanford and the University of California campuses at Berkeley, San Francisco and Davis. Many companies were attracted by the presence of these universities. Universities, government and business continue to foster an environment that promotes cooperation and entrepreneurship and removes barriers to rapid commercialization of research. The founders and employees of emerging firms also exhibited a shared spirit of camaraderie and "trail-blazing" that were critical factors in the region's success.

Start-up companies are also fostered by capital. Silicon Valley attracts the largest sum of venture capital on the planet, representing 35 percent of all venture capital invested in the U.S. As a result, there were 25,787 high-tech companies in Silicon Valley in 2001, employing 672,000 persons. Within the broad label of technology, Silicon Valley has a number of niches, including semiconductors, software, computers/communications, and professional services. The area has also shown great adaptability in moving in step with changes in the economy. Silicon Valley is also at the forefront of biotechnology, with 600 biotech firms employing 33,650 people in 2004.

BOSTON'S ROUTE 128

Like Silicon Valley, Boston's Route 128 corridor was seeded by federal research and development dollars, particularly for information technology, after World War II. Federal dollars continue to flow to Harvard University, Massachusetts Institute of Technology, Tufts University, Brandeis University, Boston University, Boston College, Northeastern University, and the University of Massachusetts, Boston. In 2000, the eight major universities, hospitals and research centers received more than $2.5 billion in research funding, over 80 percent of it from the federal government. The university-affiliated hospitals receive about $675 million in federal funds, 63 percent of all such funding for voluntary hospitals in the U.S. Less than one-half of one percent of research spending is financed by the state and local government.

The pool of intellectual talent in the region has attracted companies, including Merck, AstaZeneca and Novartis, to locate there. Businesses and universities maintain strong relationships. Although the Boston environment is not as socially networked and openly cooperative as Silicon Valley's, the area has infrastructure geared at fostering new companies.

INVESTING FOR TOMORROW

The Baltimore region compares favorably with the Research Triangle, Route 128 and Silicon Valley on many of the assets that those regions used to produce economic success.

Baltimore has a strong base of intellectual capital. The 16 members of the Baltimore Collegetown Network provide a highly skilled workforce and a well-educated population. In 2005 the Baltimore region ranked 10th among the nation's largest metropolitan areas in the percentage of population with at least a bachelor's degree. It ranks 5th in the percentage holding advanced or professional degrees. A 2001 study ranked Baltimore 18th in the total number of degrees conferred, and sixth in the number of degrees awarded in computer and information science.

Baltimore's research universities drive research and discovery in the region. Like other regions, Baltimore's institutions draw a substantial amount of funding from federal agencies. The National Institutes of Health provides significant dollars to Johns Hopkins University and the University of Maryland, Baltimore for life sciences research. Hopkins receives more NIH funds than any other university.

The State of Maryland, recognizing the benefits of commercializing research, created Maryland's Technology Development Corporation, which fosters the creation and growth of technology-related businesses through several funding mechanisms. The Maryland Department of Business and Economic Development has created the Maryland Venture Fund, a publicly funded seed and early-stage equity fund targeted to technology and bioscience companies. Collegetown members also help encourage commercialization and corporate-academic partnership through four operating or planned research parks and four business incubators.

Another characteristic of successful innovation centers is a vibrant quality of life. Baltimore compares well in this area on a number of dimensions, thanks in large part to the myriad contributions of Collegetown members. A 2006 *Forbes Magazine* survey ranked Baltimore-Washington the ninth best region for singles, and a 2007 study by the same publication ranked the Baltimore-Towson area as the fourth best place in the country to educate a child, specifically noting the region's colleges and universities as resources for K-12 students. In addition, a 2007 reader poll by *American Style Magazine* named Baltimore the 12th most popular art destination among major cities.

Baltimore needs to focus more attention and resources on several areas in order to complete the transformation of its intellectual capital into prosperous, high-performance industry clusters. Chief among them is creating additional infrastructure to support greater cohesion between academic institutions and the private sector. A main attraction of the new bioparks for private industry is the opportunity to communicate and collaborate with research faculty members. An institution similar to the Research Triangle Institute would be useful in stimulating continued faculty engagement with business and in providing an additional talent magnet for the area. In order for Baltimore to become a true center in the

COLLEGE / TOWN CONNECTIONS

The **University of Maryland, Baltimore** School of Dentistry's teaching clinics treat more than 25,000 patients per year. The school is the state's largest provider of dental services for Medicaid beneficiaries and HIV-infected persons.

The **University of Baltimore's** Truancy Court Program aims to improve overall school attendance and serves as a national model for city school systems. UB law students work closely with truant students, their parents, teachers, principals, service providers, counselors, education specialists and judges.

COLLEGE / TOWN CONNECTIONS

More than 70 women have completed **UMBC's** ACTiVATE program since its inception three years ago. The program gathers technologies from universities and federal labs throughout the region and trains mid-career women with technical or business experience to start companies based on those technologies. To date,15 companies have been founded by ACTiVATE graduates.

Villa Julie College's Career Services Office offers area businesses personal guidance, support and resources for recruiting and retaining interns and employees. Ninety-six percent of VJC graduates secure jobs within six months of graduation, the overwhelming majority of them with Maryland employers.

knowledge-based economy, the area's research universities must emulate other elite research universities in becoming premier developers and conveyers of new ideas, technology and products.

Deeper partnerships between businesses and higher education could also encourage more graduates to pursue careers in the Baltimore region. Currently only 31 percent of graduates from Collegetown institutions remain in the Baltimore area, and just over half remain in Maryland. More student internships and fellowships at local companies and agencies, as well as more dialogue on student curriculum and employee training, could increase the region's attractiveness as a "brain magnet."

Another important area of focus for the Baltimore region should be thoughtful, planned enhancements to quality of life within the region. Studies continue to show that quality of life is frequently a determining factor in relocations, both personal and corporate. The region can continue to be a magnet for creative and intellectual talent if it provides the amenities and conveniences that are appealing and attractive to students, faculty, and staff and citizens in the region alike.

Collegetown has taken the lead in enhancing transportation services that link students, faculty and staff to many campuses, as well as to commercial centers and attractions. Collegetown has also taken an active role in promoting bicycle trails throughout the area, across political jurisdictions. Given the size and importance of the higher education sector, it makes great sense to include Collegetown and its member institutions at the table in planning additional improvements in transportation, entertainment and commercial development. In particular, as regional leaders make plans to accommodate the anticipated population growth resulting from military base relocation (BRAC), the contributions of higher education institutions, and the impact upon them, should be an integral part of the discussion.

The Research Triangle, Silicon Valley and Route 128 each succeeded through a proactive collaboration among state and local government, academia and the private sector. The Baltimore Collegetown Network believes the Baltimore region has all the ingredients to be a strong economic competitor in the information-based economy, and is ready to step up to the challenges of making those ambitions real.

BALTIMORE
COLLEGETOWN

GOVERNING BOARD

Baltimore Hebrew University
Dr. Barbara G. Zirkin
Dean for Academic Administration & Chief Academic Officer

College of Notre Dame of Maryland
Dr. Irene Ferguson
Vice President for Student Development and Dean of Students

Community College of Baltimore County
Mike Carey
Executive Dean of Continuing Education & Economic Development

Coppin State University
Dr. Monica Randall
Associate Vice President for Administration and Finance

Goucher College
Tom Phizacklea
Vice President for Finance

Johns Hopkins University
Jim Zeller
*Governing Board Treasurer
Vice Provost for Budgets and Planning

Loyola College in Maryland
Terry Sawyer
Vice President of Administration

Maryland Institute College of Art
Theresa Bedoya
*Governing Board Secretary
Vice President for Admissions and Financial Aid

McDaniel College
Joyce Muller
Associate Vice President for Communications and Marketing

Morgan State University
Dr. Cecil Payton
*Governing Board Member at Large
Executive Assistant to the President

Towson University
Dr. Deb Moriarty
*Governing Board Member at Large
Vice President for Student Affairs

University of Baltimore
Peter Toran
*Governing Board President
Vice President for Planning

University of Maryland, Baltimore
Terry Smith
Senior Associate Vice President for Operations & Planning

UMBC
Lisa Akchin
*Governing Board Vice President
Associate Vice President, Marketing & Public Relations

Villa Julie College
Mark Hergan
Vice President for Enrollment Management

Baltimore City Community College

STAFF

Kristen Campbell
Executive Director

Ankur Ponda
Coordinator, Shuttle Operations & Student Involvement

Katie Ryan
Student Outreach Assistant

SPONSORS

Thank you to the following organizations that helped to fund this study:

Baltimore County Department of Economic Development

Baltimore Development Corporation

Goldseker Foundation

CREDITS

Photos

Page 1: Bruce Weller (kc); Kanji Takeno (pt)

Page 5: BCCC; Clark Vandergrift (CCBC)

Page 6: College of Notre Dame; Coppin State University

Page 8: Goucher College; Johns Hopkins University; McDaniel College

Page 9: Loyola College; MICA

Page 10: Morgan State University; Towson University

Page 11: University of Maryland, Baltimore; Governor's Office

Page 12: UMBC; Villa Julie College

Text: Don Akchin

Design: Rick Pallansch

MEMBER INSTITUTIONS

Baltimore City Community College
www.bccc.edu

Baltimore Hebrew University
www.bhu.edu

College of Notre Dame of Maryland
www.ndm.edu

Community College of Baltimore County
www.ccbcmd.edu

Coppin State University
www.coppin.edu

Goucher College
www.goucher.edu

Johns Hopkins University
www.jhu.edu

Loyola College in Maryland
www.loyola.edu

Maryland Institute College of Art
www.mica.edu

McDaniel College
www.mcdaniel.edu

Morgan State University
www.morgan.edu

Towson University
www.towson.edu

University of Baltimore
www.ubalt.edu

University of Maryland, Baltimore
www.umaryland.edu

UMBC
www.umbc.edu

Villa Julie College
www.vjc.edu

Baltimore Collegetown Network

Baltimore Collegetown Network
P.O. Box 11049
Baltimore, MD 21212
410.828.9863

www.BaltimoreCollegetown.org

The Contribution of the Baltimore Collegetown Network on the Baltimore Region's Economy

By:
Richard Clinch
Director of Economic Research
The Jacob France Institute

The Jacob *france* Institute

University *of* Baltimore
www.ubalt.edu/jfi
(410)837-4727

FEBRUARY 2008

1.0 Introduction and Summary

Colleges and universities, including associated teaching hospitals, are key drivers of the regional and state economy. The sixteen members of the Baltimore Collegetown Network (BCN) provide educational opportunities, generate new technologies, support economic development, supply skilled and educated workers for the state and regional economy, and enhance area quality of life through access to cultural, education, and sporting events.

This report assesses the economic, fiscal, economic development, workforce development, and social and cultural contributions of BCN members. This analysis is based on data provided by fifteen of sixteen members[1], including two major teaching hospitals, Johns Hopkins Hospital and the University of Maryland Medical Center because these important academic medical centers are strongly intertwined with the universities and medical schools in the region. Some of the key findings of the fifteen institutions analyzed (all figures are for fiscal year 2006):

- $17.2 billion in total economic activity ($8.0 billion direct and $9.2 billion indirect) of BCN colleges, universities, and hospitals in the Baltimore metropolitan area, including:
    - $4.5 billion dollars spent in payroll, non-payroll, endowment and other related expenditures;
    - $5.6 billion in direct and $12.0 billion in total economic activity from college and university-related spending (operating, capital, student, and visitor expenditures);
    - $2.3 billion in direct and $5.2 billion in total economic activity from university-related hospital spending (Johns Hopkins Hospital and University of Maryland Medical Center);
    - $502.0 million spent on capital expenditures;
    - $639.3 million spent in living expenses by students attracted into the region; and
    - $51.4 million spent on local purchases by more than 300,000 out-of-state visitors to BCN colleges and universities.
- 162,918 jobs are at or supported by colleges and universities (with the two academic medical centers). The direct employment of 67,084 ranks as the SIXTH largest sector in the regional economy;
- Graduates from the Baltimore Collegetown Network member institutions filled 61% of Maryland's occupational demand for teachers, 68% of the demand for engineers, 86% of the demand for pharmacists, 92% of the demand for nurses, and 100% of the demand for social workers, dentists, physicians, and lawyers;

[1] The following institutions participated in this study: Baltimore City Community College; the College of Notre Dame of Maryland; Community College of Baltimore County; Coppin State University; Goucher College; Johns Hopkins University; Loyola College in Maryland; Maryland Institute College of Art; McDaniel College; Morgan State University; Towson University; University of Baltimore; University of Maryland, Baltimore; UMBC; and Villa Julie College. Baltimore Hebrew University did not participate in this study.

- Baltimore Collegetown Network members conduct more than $2.1 billion in research and development activities and make a vital contribution to Maryland's national ranking as the state with second highest level of R&D intensity;
- Baltimore Collegetown members are the dominant generators of commercializable technology in the state and accounted for 82% of invention disclosures, 94% of patent applications, and 79% of patents issued to the major and selected Maryland research universities in FY2005;
- Baltimore Collegetown members play a vital role in the state's effort to develop high technology businesses. Three (JHU, UMB, UMBC) operate research parks, three (JHU, TU, UMBC) operate business incubators, and all educate students to fill the jobs needed to support these businesses (human resources, marketing, business analysis, etc.); and
- Three Baltimore Collegetown Network members (JHU, UMB and UMBC) accounted for 88 of Maryland's 133 start-up companies created to commercialize university-developed technologies.

Clearly BCN members have a significant and beneficial effect on the economic strength and competitiveness of the region and the state. Area colleges and universities create the core element of Maryland's competitive advantage in workforce, research, and technology. This effect is evident in the Greater Baltimore Committee's 2007 State of the Region report, which ranks Baltimore 1st among 20 peer metropolitan areas in research and development activities, and 10th in the percentage of persons with a Bachelor's degree or higher (33 percent) in 2006. At the state level, according to the Maryland Department of Business and Economic Development[2]:

- Maryland ranks second among U.S. states in educational attainment—35.1 percent of Maryland's population age 25 and above have completed a bachelor's degree or higher;
- Maryland ranks first among U.S. states in the percentage of the population 25 and older with a graduate or professional degree (15.7 percent);
- Maryland ranks first among the states in the total number of doctoral scientists and engineers as a percentage of total employment;
- Maryland ranks second among the states in research and development intensity, which is the ratio of R&D expenditures to gross domestic product (GDP) by state. Maryland ranks fourth in total R&D performance, first in federal intramural research, and fourth in R&D performed at universities and colleges; and
- Maryland ranks fourth in the nation in R&D expenditures at universities and colleges, totaling $2.36 billion in FY 2005. Further, Maryland ranks third in federal government R&D spending at universities and colleges with $1.77 billion.

This report begins with a quantitative assessment of the economic contribution made by the institutions studied and goes on to present information on the contribution of these fifteen higher educational institutions and two academic medical centers on economic development, workforce development, and the quality of life in the region using a combination of quantitative and qualitative data collected through a survey of all institutions.

[2] http://www.choosemaryland.org/Resources/pdffiles/marylandrankingsfiles/MarylandRankings.pdf

2.0 Baltimore Collegetown Network Member Institution and Teaching Hospital Spending

The fifteen Baltimore Collegetown Network (BCN) member institutions analyzed in this report are important sources of spending in the Baltimore Metropolitan Area[3] regional economy. This report assesses the economic contribution of this spending on the regional economy using data on operating (payroll, non-payroll, endowment, and other educational expenditures), capital, estimated student, and estimated visitor expenditures collected through a survey of all BCN members.[4]

Consistent with other economic impact reports, this report includes all expenditures made by the fifteen BCN members. However, the combination of public and private universities in this analysis creates some difficulty. There is considerable debate in economics literature on what constitutes the direct impact of a college or university. Many reports exclude all state support and contracts; others use only in-state expenditures. Because the geographic focus of this analysis is the metropolitan area, and it includes all major public and private colleges and universities, this analysis is based on all spending by these institutions. This can be interpreted as the economic contribution made by all major higher education institutions in the region – regardless of the source of funding. In reality, this economic contribution estimate would represent a higher, upper bound estimate of the economic impacts of these institutions because this analysis does not attempt to adjust for the potential substitution of the higher education services provided by BCN members by other higher education institutions or for the potential re-allocation of the state funds used for other uses. Thus, this report measures the economic linkages – or economic contribution – made by institutions of higher education rather than the more narrow economic impact of these institutions, which would only include net new and incremental spending.

This report also separately analyzes the economic contributions made by two major teaching hospitals, Johns Hopkins Hospital and University of Maryland Medical Center, whose history and operations are linked to the major medical schools located in Baltimore City. As with the college and university analysis described above, this report includes all revenues of these hospitals, not just those that are net, new, and incremental to a region. In the absence of these two hospitals, other regional hospitals would be available to offer many of the same health care services. Typically, economic impact analyses for hospitals include only out-of-state patients attracted into the region by the quality of the hospital and the specialized areas of tertiary and quaternary care, where only limited opportunities for local substitution exists. Thus, this report measures the economic linkages – or economic contribution – made by these two hospitals rather than the more narrow economic impact of these institutions, which would only include net new and incremental spending.

The four expenditure categories used for BCN members and hospital revenue estimates in this analysis are described below.

College and University Operating Expenditures are the reported payroll, non-payroll, endowment and other related educational expenditures of the fifteen participating institutions. Student salaries and wages of $147.2 million were excluded from this analysis because these are included in Student Living Expenses described below. The majority of these university-

[3] The Baltimore Metropolitan Area is defined as Baltimore City and Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties.

[4] As described in note 1 above – 15 of the 16 BCN members completed the survey.

operating expenditures are derived from the revenues associated with student tuition and fees, research contracts (more than $1 billion), and charitable contributions that are attracted into the Baltimore Metropolitan region by these fifteen institutions. Some of these expenditures were supported by nearly $640 million in State appropriations and aid received by some of the BCN institutions. These operating expenditures account for 79% of the total expenditures associated with BCN institutions.

College and University Capital Expenditures are the reported capital expenditures provided by each of the participating BCN member institutions. BCN institutions spent $502.0 million on capital projects in fiscal 2006, accounting for 9% of the total expenditures associated with the institutions studied.

Student Expenditures represent the living expenses of the 78,441 full-time undergraduate and graduate students enrolled at the fifteen BCN member institutions. This report bases student living expenses on full-time students only, not the living expenses of the total of 120,333 students enrolled in BCN members. The living expenditures of part-time students were excluded in this analysis, since most of these students already reside in the region and were presumably not attracted into the region to attend a college or university.[5] Student living expenditures were calculated by having each institution estimate the cost of living for four classifications of students: 1) undergraduates living on-campus; 2) undergraduates living off-campus; 3) graduate and professional students living on-campus; and 4) graduate and professional students living off-campus. Student living expenses ranged from a low of $1,800 for an undergraduate student living on-campus at Village Julie College to a high of $16,632 for a graduate/professional student living off-campus at UMBC. In some cases the data provided by the BCN member in the survey was very different from peer institutions. In these cases, JFI used the student cost of living estimate from each institution's financial aid office website. Per student living expenses were multiplied by the number of students in each classification to yield total student living expenditures. In fiscal 2006, the 78,441 full-time undergraduate and graduate enrolled at the fifteen BCN institutions analyzed had total living expenditures of $639.3 million and accounted for 11% of the total expenditures associated with the BCN institutions studied.

Visitor Expenditures represent expenditures by out-of-state visitors attracted into the region by BCN member institutions. Visitors are attracted into the region for admissions-oriented visits, to visit students or friends attending a regional college or university, or to attend conferences, seminars, symposia, or sporting events. Each institution was asked to estimate the number of out-of-state visitors to their campus, with a total of just over 300,000 visitors estimated as being attracted into the region from out-of-State.[6] These visitors spend an estimated $51.4 million.[7]

Academic Medical Center Revenues and Employment is the self-reported health-care revenues and employment of Johns Hopkins Hospital and the University of Maryland Medical

[5] Excluding part-time students provides a conservative estimate of overall student expenditures. Some students commute into the greater Baltimore region from out of State or out of the region and their expenditures on transportation, food, and educational supplies are not included in this analysis. Other part-time students were attracted into the region to attend a college or university. Furthermore, estimated per student living expenses based on financial aid data often under-estimate actual student spending. Thus, overall student spending may be higher than this estimate.

[6] Only ten of the fifteen participating institutions provide an estimate of out-of-State visitors or spending.

[7] Based on prior JFI research, each visitor is estimated to spend $170 over the course of his or her visit.

Center. As described above, these figures do not attempt to adjust for the potential of other regional hospitals to provide competing services.

Table 1
Total Spending for
The 15 Baltimore Collegetown Network Institutions
And Academic Medical Center Hospital Revenues

Item	
Total BCN Colleges and Universities and Hospitals	**$7,973,907,845**
Baltimore Collegetown Network Institution-Related Expenditures	**$5,645,951,845**
Total Operating Expenditures	**$4,453,187,844**
Payroll Expenditures[1 2]	$2,442,506,349
Non-Payroll Expenditures[2]	$1,847,466,639
Other Expenditures	$13,312,594
Endowment Expenditures	$149,902,262
Capital Expenditures	**$502,043,236**
Student Living Expenditures	**$639,339,378**
Visitor Expenditures	**$51,381,387**
Academic Medical Center Hospital Revenues[3]	**$2,327,956,000**

(1) Less Wages and Salaries Paid to Students
(2) Loyola College did not break down its expenses into payroll and non-payroll expenses. Out of necessity, these were estimated based on the share of expenditures going to each based on all of the other institutions.
(3) JHH and UMMC

Source: BCN and JFI

3.0 The Economic Contribution of Baltimore Collegetown Network Member Institution and Teaching Hospital Spending

The expenditures made by the fifteen BCN colleges and universities and two academic medical center hospitals are circulated within the region's economy and become income for other businesses and residents. This creates "multiplier" or "spin-off" effects as this money is spent, earned and re-spent in the local economy through successive rounds of economic activity. Thus, each dollar of spending creates more than one dollar of economic activity as that dollar is earned and, in-turn spent, by others in the regional economy.

The expenditures associated with operations, capital projects, students and visitors were used to estimate the output (a measure similar to business volume) which measures the level of business activity in a region, employment, and employee compensation generated by the fifteen BCN institutions and two academic medical center hospitals using the RIMS II economic model for the Baltimore Metropolitan Area developed by the Bureau of Economic Analysis of the U.S. Bureau of the Census. Each area of expenditures was analyzed using industry-specific RIMS II multipliers for each relevant sector. In the case of student and visitor expenditures, blended multipliers were derived using information on student and tourism spending. The estimated regional output supported by the fifteen BCN institutions and two academic medical center hospitals is presented in Table 2. Direct impacts are the changes in economic activity directly attributable to the college, university, and hospital. Indirect impacts are the "multiplier" effects caused by the college, university, and hospital expenditures in the regional economy. Total impacts are the direct plus the indirect impacts.

Total BCN member operating, capital, student, and visitor expenditures of more than $5.6 billion are leveraged with an additional $6.4 billion in indirect spending for a total impact of over $12.0 billion. The operational expenditures by the colleges and universities account for the overwhelming majority (83%) of the economic activity associated with BCN members, with capital expenditures accounting for 9% of economic activity, student expenditures for 7% and visitor expenditures for 1%. Total revenues of $2.3 billion for the two academic medical center hospitals supports an additional $5.2 billion in economic activity in the region – ***for a combined impact of $17.2 billion in regional economic activity supported by the fifteen BCN institutions and two affiliated academic medical center hospitals.***

Table 2
Output Impact of
The 15 Baltimore Collegetown Network Insitutions and Academic Medical Centers
On the Baltimore Metropolitan Area
(Millions of Dollars)

Item	Direct Impact	Indirect Impact	Total Impact
Total BCN Colleges and Universities and Hospitals	**$7,973.9**	**$9,252.2**	**$17,226.1**
Total BCN Colleges and Universities	**$5,646.0**	**$6,388.4**	**$12,034.3**
Total Operating Expenditures[1]	$4,453.2	$5,563.5	$10,016.7
Capital Expenditures	$502.0	$580.3	$1,082.4
Student Living Expenditures	$639.3	$193.2	$832.5
Visitor Expenditures	$51.4	$51.3	$102.7
Academic Medical Center Hospital Revenues	**$2,328.0**	**$2,863.9**	**$5,191.8**

(1) Less Wages and Salaries Paid to Students

Source: BCN and JFI

4.0 The Employment and Earnings Contribution of Baltimore Collegetown Network Member Institution and Teaching Hospital Spending

BCN institutions employ a total of 43,364 workers and Johns Hopkins Hospital and University of Maryland Medical Center employ a combined total of 20,005 workers. To put this in context, as presented in Table 5, when BCN is compared to employment in key private industry sectors[8], it would be the 11th largest sector in the regional economy, and the fifteen BCN members combined with the two academic medical centers, with combined employment of 63,369, would be the sixth largest sector in the regional economy.

The 63,369 jobs in BCN members and academic medical center hospitals are combined with an additional 3,715 construction jobs created by the $502.0 in capital expenditures (Table 3). Thus, the operations of the fifteen BCN member colleges and universities and academic medical center hospitals directly create a total of 67,084 jobs. As presented in Table 6, there is a total of $3.5 billion in employee compensation associated with these jobs.

The operating, capital, student and visitor spending associated with the fifteen BCN institutions generates an additional 71,172 jobs in the region earning $2.2 billion in employee compensation. The operations of Johns Hopkins Hospital and University of Maryland Medical Center generate an additional 24,662 jobs earning $954.5 million. Thus, including economic multiplier affects the fifteen BCN member colleges and universities and academic medical center hospitals support a combined total of 162,918 jobs earning $6.6 billion in employee compensation. ***The 162,918 jobs at or supported by the fifteen BCN member colleges and universities and academic medical center hospitals account for 12.5 percent of total Baltimore Metropolitan Area's employment of 1.3 million.***

The BCN members were also asked to provide statistics on their employment of minority workers. Thirteen of the fifteen institutions, with 35,834 employees provided this information. Minority employment ranged from a low of 6% of workers at McDaniel College to a high of 96% at Morgan State University, with the overall average share of employment of minority workers being 29% or 10,530 out of the 35,834 employees at reporting institutions.

[8] It was impossible to compare BCN and academic medical center employment to total non-farm employment because data on state and local government employment were not available broken down by sector – i.e. for education, public safety, agency, etc.

Table 3
Employment Impact of
The 15 Baltimore Collegetown Network Institutions and Academic Medical Centers
On the Baltimore Metropolitan Area
(Number of Jobs)

Item	Direct Impact	Indirect Impact	Total Impact
Total BCN Colleges and Universities and Hospitals	**67,084**	**95,834**	**162,918**
Total BCN Colleges and Universities	**47,079**	**71,172**	**118,251**
College and University Employment	43,364	57,328	100,692
Capital Expenditures	3,715	4,336	8,051
Student Living Expenditures	n.m.	8,186	8,186
Visitor Expenditures	n.m.	1,321	1,321
Academic Medical Center Employment	**20,005**	**24,662**	**44,667**

Source: BCN and JFI

Table 4
Total Employment by The 15 Baltimore Collegetown Network Institutions and Academic Medical Centers

Item	
Total BCN	43,364
Baltimore City Community College	1,132
College of Notre Dame of Maryland	278
Community College of Baltimore County	2,384
Coppin State University	323
Goucher College	577
Johns Hopkins University	21,816
Loyola College of Maryland	1,235
Maryland Institute College of Art	614
McDaniel College	430
Morgan State University	2,233
Towson University	2,937
UMBC	2,490
University of Baltimore	1,007
University of Maryland, Baltimore	5,194
Villa Julie College	714
Academic Medical Center Employment	20,005
Johns Hopkins Hospital	11,679
University of Maryland Medical Center	8,326

Source: BCN and JFI

Table 5
Employment of BCN Members and Related Academic Medical Centers Compared to Key Private Sector Industries

Sector	Employment
Retail Trade	143,800
Accommodation & Food Services	95,000
Natural Resources, Mining & Construction	86,500
Administrative & Support Services	82,500
Manufacturing	73,600
BCN[1]	63,369
Finance and Insurance	60,700
Wholesale Trade	56,400
Other (Personal) Services	55,400
Ambulatory Health Care Services	47,400
All Other Hospitals[2]	44,195
Transportation & Warehousing	39,700

(1) Including both BCN members and JHH and UMMC.
(2) Not Including JHH and UMMC - which are included in the BCN.

Source: BCN and BLS

Table 6
Employee Compensation Impact of
The 15 Baltimore Collegetown Network Institutions and Academic Medical Centers
On the Baltimore Metropolitan Area
(Millions of Dollars)

Item	Direct Impact	Indirect Impact	Total Impact
Total BCN Colleges and Universities and Hospitals	**$3,476.7**	**$3,151.2**	**$6,627.8**
Total	**$2,615.6**	**$2,196.7**	**$4,812.3**
College and University Employment	$2,442.5	$1,795.7	$4,238.2
Capital Expenditures	$173.1	$161.5	$334.6
Student Living Expenditures	n.m.	$207.9	$207.9
Visitor Expenditures	n.m.	$31.6	$31.6
Academic Medical Center Employment	**$861.1**	**$954.5**	**$1,815.6**

Source: BCN and JFI

5.0 The Estimated Fiscal Impact of Baltimore Collegetown Network Member Institution and Teaching Hospital Spending

BCN member colleges and universities and academic medical center hospitals also impact the fiscal health of the state and region. The salaries and wages earned by college, university, and hospital employees and the jobs created and sustained through college and university operating, capital, student and visitor spending, and hospital operations are all subject to state and local income taxes. Many of the purchases made by BCN member colleges and universities and academic medical center hospital employees and the associated jobs created in the regional economy are also subject to state sales taxes. As presented in Table 7, the JFI estimated the state income and sales tax revenues and aggregate local income tax revenues associated with the economic activity created and supported by the BCN member colleges and universities and academic medical center hospitals.

- The fifteen BCN members and two academic medical center hospitals generate an estimated $235.8 million in state income and sales tax revenues and an estimated $84.5 million in local income tax revenues.
- The fifteen BCN members alone generate an estimated $171.2 million in state income and sales tax revenues and an estimated $61.4 million in local income tax revenues.

Table 7
Fiscal Impact of
The 15 Baltimore Collegetown Network Institutions and Academic Medical Centers
(Millions of Dollars)

Item	Direct Impact	Indirect Impact	Total Impact
Total BCN Colleges and Universities and Hospitals			
Total State Government Revenues	**$123.7**	**$112.1**	**$235.8**
State Income Tax[1]	$71.7	$65.0	$136.7
Retail Sales Tax[2]	$52.0	$47.1	$99.1
Estimated Local Income Tax Revenues[1]	**$44.3**	**$40.2**	**$84.5**
Total BCN Colleges and Universities Only			
Total State Government Revenues	**$93.1**	**$78.2**	**$171.2**
State Income Tax[1]	$54.0	$45.3	$99.3
Retail Sales Tax[2]	$39.1	$32.8	$71.9
Estimated Local Income Tax Revenues[1]	**$33.4**	**$28.0**	**$61.4**

(1) Calculated as the incremental increase in earnings multiplied by the effective state or local income tax rate.
(2) An average of 29.9% of income is spent on goods subject to sales taxes calculated using Maryland's 5% sales tax rate.

Source: University of Maryland and The Jacob France Institute

6.0 Workforce Development Impact of the Baltimore Collegetown Network

The primary impact of the Baltimore Collegetown Network's members on the state and region is through the educational training and services that they provide. The availability of a skilled labor force is considered a key issue by businesses in location decisions and is an important determinant of economic growth. Universities play a vital role in providing a workforce with the education, skills and training required by the business community, particularly with the growing importance of high technology in today's market. Maryland ranks second among U.S. states in educational attainment in terms of workers with a Bachelor's Degree or higher, first in the percentage of the population 25 and older with a graduate or professional degree, and first in the total number of doctoral scientists and engineers as a percentage of total employment. Baltimore Collegetown Network's members play a critical role in providing this skilled and educated workforce.[9]

6.1 Importance of Higher Education

One of the primary benefits of higher education is an enhanced standard of living enjoyed by college graduates. Higher educational attainment generally results in increased earnings and a higher standard of living. In 2005, the median income for males with a bachelor's degree nationally was 72% higher than the income of those with only a high school diploma. The results for females were significantly higher; with females having a bachelor's degree earning 96% more than women with only high school diploma (see Table 8). This revenue gain from additional education can be significant over the course of a lifetime. Previous research conducted by the Jacob France Institute for the University System of Maryland found that "the average graduate of a Maryland public four-year college or university can be expected to earn an estimated $2.5 million more in incremental earnings than a high school graduate over his or her lifetime."[10]

Table 8
Median Income of Individuals
by Educational Attainment, 2005

	Median Income	
Highest Degree Earned	Male	Female
High School Degree	$30,134	$16,695
Bachelor's Degree	$51,700	$32,668
Master's Degree	$64,468	$44,385
Doctorate Degree	$76,937	$56,820
Professional Degree	$90,878	$59,934

Source: U.S. Census, CPS 2006 Annual Social & Economic Supplement

A second benefit attributable to higher education is a better-educated workforce. By preparing new workers and upgrading the skills of the existing workforce, universities ensure

[9] Because many community college graduates go on to complete their education, this analysis focuses on the role of the Baltimore Collegetown Network's four-year institutions.
[10] Jacob France Institute. *The Economic Impact of the University of Maryland, Baltimore on the State of Maryland.* September 2003.

that Maryland companies can find the employees they need. As a result, the state gains an "industrial competitive advantage" that enables businesses to compete more effectively regionally, nationally, and globally. Maryland has the distinction of having one of the best educated resident populations in the nation. According to the Maryland Department of Business and Economic Development, Maryland ranks second among U.S. states in educational attainment with over 35% of persons aged 25 and above completing a bachelor's degree or higher. The presence of BCN institutions significantly contributes to this competitive advantage, especially in the health care, technology, and biomedical industries that are vital for Maryland's future.

6.2 The Baltimore Collegetown Network's Role in Maryland Higher Education

The Baltimore Collegetown Network accounts for 45% of enrollment in Maryland's four-year degree granting institutions (see Table 9). This includes 44% of full-time undergraduate students, 26% of part-time undergraduate students, 61% of full-time graduate/professional students, and 55% of part-time graduate/professional students. While universities play an important role for all businesses, they are especially important for health and high technology companies such as biotech and biomedical firms, which Maryland has targeted for growth. According to the *Maryland Statewide Commission on the Crisis in Nursing*, "enrollment and graduation rates for entry-level RNs are increasing in Maryland and nationwide, however; current levels will fail to fill the vacancies predicted for the next 10 years." The Health Resources and Services Administration expect a shortfall of 600,000 nurses, while the Department of Labor puts the number closer to one million vacancies"[11]. A measure of the importance of BCN institutions is that their graduates fill 61% of the state's occupational demand for teachers, 68% of the demand for engineers, 86% of the demand for pharmacists, 92% of the demand for nurses, and 100% of the demand for social workers, dentists, physicians, and lawyers. BCN is comprised of numerous schools that are highly recognized and accredited with exceptional programs that provide needed education and training in preparation for future occupations.

[11] Maryland Statewide Commission on the Crisis in Nursing. (2005). Nursing Faculty Shortage: Causes, Effects, and Suggestions for Resolution. September 2005.

Table 9
BCN's Share of Total Maryland Enrollment
at Four-Year Degree Granting Institutions, Fall 2005 (Number of Students)

	Collegetown Network	All Maryland Institutions	Percent of Total
TOTAL	**86,727**	**191,547**	**45.3%**
Full-Time Undergraduate	44,062	99,815	44.1%
Part-Time Undergraduate	8,061	31,584	25.5%
Full-Time Graduate/Professional	14,168	23,233	61.0%
Part-Time Graduate/Professional	20,436	36,915	55.4%

Source: Maryland Higher Education Commission

The Baltimore Collegetown Network plays a significant role in offering a diversified selection of degree programs to appeal to undergraduate, graduate, and professional students. BCN members awarded just under half (49%) of the total 41,152 degrees earned in public and private universities in Maryland in 2005 (see Table 10). Additionally, member institutions awarded 42% of undergraduate degrees received in Maryland, 59% of master's degrees, 50% of doctorate degrees, and 91% of the total professional degrees earned.

Table 10
Degrees Awarded by BCN and All
Public and Private Colleges and Universities in Maryland in 2006

Program	All Public and Private Colleges and Universities	Collegetown Network	Collegetown as a % of Total
Total Degrees	**41,152**	**20,345**	**49.4%**
Bachelors Degree	25,484	10,792	42.3%
Masters Degree	13,268	7,886	59.4%
Doctorate Degree	1,278	641	50.2%
Professional Degree	1,122	1,026	91.4%

6.2.1 Undergraduate Education

The Baltimore Collegetown Network provides a broad selection of undergraduate programs. These programs account for 42% of the total amount of undergraduate degrees awarded in Maryland. BCN institutions provide a highly educated workforce in many areas

including: business, education, psychology, biological sciences, arts, engineering, health care, and social science fields (see table 11). Graduates account for 84% of total health care degrees awarded (68% awarded in nursing alone), 63% of arts degrees, 46% of psychology degrees, 42% of education degrees, and 41% of biological sciences degrees. Additionally, member institutions account for 37% of undergraduate engineering degrees, 36% of the business degrees, and 35% of total social science degrees awarded in 2006, as well as 3,040 students who graduate from other programs.

Table 11
Bachelor's Degrees Awarded by BCN
and All Public and Private Colleges and Universities in Maryland in 2006

Program	All Public and Private Colleges and Universities	Collegetown Network	Collegetown Network as a % of Total
Total Bachelor's Degrees	**25,484**	**10,792**	**42.3%**
Business	**4,407**	**1,598**	**36.3%**
Education	**1,929**	**804**	**41.7%**
Psychology	**1,702**	**775**	**45.5%**
Biological Sciences	**1,465**	**603**	**41.2%**
Arts	**1,248**	**785**	**62.9%**
Engineering	**1,132**	**415**	**36.7%**
Chemical Engineering	72	45	62.5%
Civil Engineering	83	25	30.1%
Electrical Engineering	269	80	29.7%
Mechanical Engineering	247	75	30.4%
Other Engineering	461	190	41.2%
Health	**1,649**	**1,381**	**83.7%**
Nursing	1,409	964	68.4%
Other Health	240	417	173.8%
Social Science	**3,955**	**1,391**	**35.2%**
Social Workers	669	121	18.1%
Other Social Science	3,286	1,270	38.6%
Other Degrees	**7,997**	**3,040**	**38.0%**

Source: Maryland Higher Education Commission

6.2.2 Master's Education

Baltimore Collegetown Network institutions assume an especially important role in providing advanced degrees in many fields. As seen in Table 12, BCN members awarded over half (59%) of all master's degrees awarded by public and private universities in Maryland in 2006, including 89% of all health care degrees, 80% of arts degrees, 74% of biological sciences degrees, 73% of social science degrees, 73% of psychology degrees, and 72% of education degrees. Additionally, the BCN members awarded 55% of total graduate engineering degrees, providing the majority of degrees in the chemical (83%), electrical (74%), and mechanical (68%) engineering fields. An additional 1,614 degrees were awarded in a variety of other disciplines.

Table 12
Master's Degrees Awarded by BCN
and All Public and Private Colleges and Universities in Maryland in 2006

Program	All Public and Private Colleges and Universities	Collegetown Network	Collegetown Network as a % of Total
Total Master's Degrees	**13,268**	**7,886**	**59.4%**
Business	**3,650**	**1,269**	**34.8%**
Education	**2,985**	**2,156**	**72.2%**
Psychology	**390**	**284**	**72.8%**
Biological Sciences	**423**	**311**	**73.5%**
Arts	**316**	**252**	**79.7%**
Engineering	**795**	**439**	**55.2%**
Chemical Engineering	18	15	83.3%
Civil Engineering	46	10	21.7%
Electrical Engineering	229	169	73.8%
Mechanical Engineering	74	50	67.6%
Other Engineering	428	195	45.6%
Health	**1,054**	**940**	**89.2%**
Nursing	222	193	86.9%
Other Nursing	832	747	89.8%
Social Science	**853**	**621**	**72.8%**
Social Workers	357	357	100.0%
Other Social Science	496	264	53.2%
Other Degrees	**2,802**	**1,614**	**57.6%**

Source: Maryland Higher Education Commission

6.2.3 Doctoral Education

Baltimore Collegetown Network institutions play a significant role in providing doctoral degrees, awarding over half (50.2%) of the total degrees by all public and private universities in Maryland. While BCN members account for 39% of the doctoral engineering degrees awarded, they awarded nearly all (95%) of the health doctoral degrees, including all doctoral nursing degrees. BCN members also awarded 100% of the doctoral degrees in social work in 2006, 76% of biological sciences doctoral degrees, 69% of psychology doctoral degrees, and 26% of education doctoral degrees. An additional 84 doctoral degrees were awarded in a variety of fields, such as the biological sciences, psychology and education.

Table 13
Doctorate Degrees Awarded by BCN
and All Public and Private Colleges and Universities in Maryland in 2006

Program	All Public and Private Colleges and Universities	Collegetown Network	Collegetown Network as a % of Total
Total Doctorate Degrees	**1,278**	**641**	**50.2%**
Business	**27**	**1**	**3.7%**
Education	**106**	**27**	**25.5%**
Psychology	**55**	**38**	**69.1%**
Biological Sciences	**183**	**139**	**76.0%**
Arts	**72**	**12**	**16.7%**
Engineering	**200**	**78**	**39.0%**
Chemical Engineering	23	13	56.5%
Civil Engineering	15	3	20.0%
Electrical Engineering	57	23	40.4%
Mechanical Engineering	47	9	19.1%
Other Engineering	58	30	51.7%
Health	**262**	**250**	**95.4%**
Nursing	21	21	100.0%
Other Health	241	229	95.0%
Social Science	**94**	**12**	**12.8%**
Social Workers	9	9	100.0%
Other Social Science	85	3	3.5%
Other Degrees	**279**	**84**	**30.1%**

Source: Maryland Higher Education Commission

6.2.4 Professional Education

The Baltimore Collegetown Network also plays an important role in the awarding of professional degrees in Maryland. As seen in Table 14, BCN members awarded 91% of all professional degrees by public and private colleges and universities in Maryland in 2006. BCN members provided 100% of all dentistry, medicine, and pharmacy professionals graduating in Maryland and provided 100% of all professional law degrees received. The professional degrees awarded have a significant impact on the state's economy in that these are high-wage and technical occupations for which there is great demand.

Table 14
Professional Degrees Awarded by BCN
and All Public and Private Colleges and Universities in Maryland in 2006

Program	All Public and Private Colleges and Universities	Collegetown Network	Collegetown Network as a % of Total
Total Professional Degrees	**1,122**	**1,026**	**91.4%**
Health	**541**	**512**	**94.6%**
Dentistry	106	106	100.0%
Medicine	248	248	100.0%
Pharmacy	158	158	100.0%
Other Health	29	0	0.0%
Law	**514**	**514**	**100.0%**
Other Degrees	**67**	**0**	**0.0%**

Source: Maryland Higher Education Commission

6.3.1 Role of Baltimore Collegetown Network Members in Minority Education

The Baltimore Collegetown Network plays an important role in providing degrees to minority students in Maryland. There are over 70,000 African American full-time undergraduate and over 11,000 full-time African American graduate and professional students attending colleges and universities in Maryland. According to the National Center for Education Statistics, Maryland is ranked 6th nationally in terms of minority enrollment.[12] As presented in Table 15, the Baltimore Collegetown Network schools make a key contribution to Maryland's success in promoting minority educational opportunities, BCN members account for 37% of the African American full-time undergraduate enrollment and 47% of the full-time graduate and professional student enrollment. The greatest numbers of African American students attend Morgan State University, the Community College of Baltimore County, and Baltimore City Community College. The schools in the Baltimore Collegetown Network also play an important role in educating Hispanic residents. Of the Hispanic full-time students enrolled at Maryland Colleges

[12] http://nces.ed.gov/programs/digest/d06/tables/dt06_212.asp?referrer=list

and Universities, 18% of the undergraduate and 49% of the graduate and professional degree students attend Baltimore Collegetown Network colleges and universities.

Table 15
Minority Student Enrollment for Baltimore Collegetown Network
And All Maryland Higher Education Institutions

Item	African American Full Time Undergraduate	African American Full Time Graduate & Professional	Hispanic Full Time Undergraduate	Hispanic Full Time Graduate & Professional
Total Maryland	70,602	11,231	10,580	1,718
Total Maryland Community Colleges	34,458	0	5,604	0
Total Maryland Public Colleges and Universities	31,390	8,710	3,967	1,154
Total Maryland Independent Colleges and Universities	4,754	2,521	1,009	564
Baltimore Collegetown Network as a % of Total	37%	47%	18%	49%
Total Baltimore Collegetown Network	25,848	5,299	1,925	850
Baltimore City Community College	5,580	0	83	0
College of Notre Dame of Maryland	431	346	40	28
Community College of Baltimore County	5,920	0	380	0
Coppin State University	3,117	679	10	3
Goucher College	60	81	50	10
Johns Hopkins University (n/i APL)	497	986	318	364
Loyola College of Maryland	165	280	98	49
Maryland Insitute College of Art	63	11	67	10
McDaniel College	95	217	27	28
Morgan State University	5,559	574	55	5
Towson University	1,679	479	379	47
UMBC	1,409	262	359	56
University of Baltimore	644	573	32	68
University of Maryland, Baltimore	217	776	27	182
Villa Julie College	412	35	N/A	N/A
BCN Four Year Colleges and Universities Only	14,348	5,299	1,462	850
% of Four Year Colleges and Universities	40%	47%	29%	49%
BCN Community Colleges Only	11,500		463	
% of Community Colleges	33%		8%	

Source: MHEC

Baltimore Collegetown Network colleges and universities award a significant portion of the degrees awarded to African American and Hispanic students. As seen in Table 16, Baltimore Collegetown Network colleges and universities awarded 36% of the undergraduate degrees and 51% of the graduate and professional degrees awarded to African Americans in 2006. The institutions that awarded the largest number of undergraduate degrees to African Americans included Morgan State University, Baltimore City Community College, and the Community College of Baltimore County. Johns Hopkins University, the University of Maryland, Baltimore, and the University of Baltimore awarded the largest number of graduate and professional degrees to African American students. BCN institutions also award a significant share of degrees earned

by Hispanic students in Maryland with 23% of the undergraduate degrees and 92% of the graduate and professional degrees awarded to Hispanic students in 2006.

Table 16
Minority Student Graduation for Baltimore Collegetown Network
And All Maryland Higher Education Institutions

Item	African American Full Time Undergraduate	African American Full Time Graduate & Professional	Hispanic Full Time Undergraduate	Hispanic Full Time Graduate & Professional
Total Maryland	8,341	2,336	1,323	393
Total Maryland Community Colleges	2,720	0	393	0
Total Maryland Public Colleges and Universities	4,291	1,727	716	234
Total Maryland Independent Colleges and Universities	1,330	609	214	159
Baltimore Collegetown Network as a % of Total	36%	51%	23%	92%
Total Baltimore Collegetown Network	2,976	1,191	307	363
Baltimore City Community College	472	0	N/A	N/A
College of Notre Dame of Maryland	68	76	11	5
Community College of Baltimore County	414	0	31	0
Coppin State University	320	82	1	0
Goucher College	N/A	N/A	11	1
Johns Hopkins University (n/i APL)	82	301	71	107
Loyola College of Maryland	43	62	19	13
Maryland Insitute College of Art	12	5	N/A	N/A
McDaniel College	35	32	7	3
Morgan State University	699	103	2	0
Towson University	271	108	66	16
UMBC	218	35	62	7
University of Baltimore	155	160	10	14
University of Maryland, Baltimore	119	223	12	197
Villa Julie College	68	4	4	0
BCN Four Year Colleges and Universities Only	2,090	1,191	276	363
% of Four Year Colleges and Universities	37%	51%	30%	92%
BCN Community Colleges Only	886		31	
% of Community Colleges	33%		8%	

Source: MHEC

6.4 Occupational Demand for Collegetown Graduates

The Baltimore Collegetown Network attracts students from Maryland as well as from across the United States and the world. Upon graduation, many of these students choose to remain in Maryland. While not all BCN member institutions provided information on the retention of these graduates in the state and region, responding BCN members reported that 80% to 95% of in-State students and 10% to 71% of out-of-State students choose to remain in Maryland after graduation.[13] When BCN member institutions provided information on the residence of their alumni, 54% of the alumni of reporting institutions lived in Maryland[14] and 42% of the alumni of reporting institutions lived in the Greater Baltimore region.[15] Thus, BCN members play a major role in providing skilled and educated workers in the state and region.

Table 17 lists the number of graduates from Universities in the Collegetown Network compared to the projected occupational openings for key degree areas.[16] Compared to total average annual openings for these occupations in Maryland, the Baltimore Collegetown Network's members meet 88% of the occupational demand for selected key occupations, thereby illustrating its role in meeting not only the local market, but the regional and national market as well. BCN members provide 61% of the annual demand for teachers, 68% of the annual demand for engineers, 86% of the annual demand for pharmacists, and 92% of the annual demand for nurses. BCN institutions also provide over 100% of the annual demand for several other occupations. This is possible because many graduates may leave the State of Maryland. The Baltimore Collegetown Network provides for 213% of the annual demand for Social Workers, 123% of the annual demand for dentists, 131% of the annual demand for physicians, and 126% of the annual demand for lawyers. This analysis is for 9,540 of BCN's graduates covers and nearly one half of the BCN's total 2006 graduating class of 20,345 students at all degree areas and levels, leaving 10,805 other graduates, many of whom go on to work in other occupations and sectors.

[13] Nine BCN members reported retention of in-State students and seven reported on retention of out-of-State students.
[14] For 11 reporting institutions.
[15] For 9 reporting institutions
[16] It is not possible to match all degree areas to occupations. For example, many students with non-business degrees graduate and work in business related occupations. Thus, this analysis focuses on degree areas, such as education or nursing, where occupations are closely matched to the degree.

Table 17
Occupational Demand for
Baltimore Collegetown Network Graduates

Occupation	Maryland Occupational Demand	Baltimore Collegetown Network	Graduates as a % of Demand[1]
Total	**10,854**	**9,540**	**87.9%**
Teachers[2]	4,871	2,987	61.3%
Engineers[3]	1,368	932	68.1%
Social Workers[4]	949	2,024	213.3%
Health			
Dentists	86	106	123.3%
Pharmacists	184	158	85.9%
Nurses[5]	2,800	2,571	91.8%
Physicians[6]	189	248	131.2%
Lawyers	407	514	126.3%

Source: Maryland Department of Labor, Licensing, and Regulation

[1]The Baltimore Collegetown Network provides education and training both regionally and nationally. Graduates may take their skill sets to other occupations and locations. Thus, the total number of graduates may exceed State demand.

[2]Includes occupational titles 25-1011 through 25-2043

[3]Includes occupational titles 17-2011 through 17-2199

[4]Includes occupational titles 21-1011 through 21-1029.

[5]Includes registered nurses and licensed practical nurses.

[6]Includes surgeons.

6.5 Selected Baltimore Collegetown Network Member Workforce Programs

Baltimore Collegetown Network institutions have many programs that are oriented toward creating a skilled and educated workforce. While the primary mission of colleges and universities is to educate students and prepare them for entry into the workforce, these programs are vital in assisting both students and the outside community. Examples of some of these programs are listed below.

- The Community College of Baltimore County's Credit and Continuing Education and Economic Development Programs enroll over 65,000 unduplicated students each year. Almost all CCBC students are currently employed and using CCBC courses and programs to acquire skills to perform their current work and the learning needed to transfer and to prepare for new responsibilities.
- The College of Notre Dame offers opportunities to assist local community members that also promote professional development and enrich life experiences. Some examples include:
    - **The Renaissance Institute**: a unique learning community for men and women where all classes are member-taught, focusing on the expertise of the institute members and providing leadership and teachable moments for everyone involved; and
    - The **English Language Institute:** intensive English programs for non-native speakers of all ages within the Baltimore community. In particular, Spanish for healthcare professional have been developed to better serve community members.
- Coppin State University has partnered with the Baltimore Teacher's Union (BTU) and Prince George's County to offer courses to professional educators who may need to obtain or maintain certification credentials. Teachers may either obtain a degree or certification through the partnerships. The program also assists the state to overcome the critical shortage of teachers and fulfills legislative requirements of No Child Left Behind.
- Goucher College's Post-Baccalaureate Premedical Program, designed to prepare college graduates who did not major in the sciences for medical school, is one of the best in the nation, boasting a medical school appearance rate of 100 percent among its graduates for several years running.
- The Division of Continuing Studies at the Maryland Institute College of Art offers three undergraduate level certificates in Graphic and Digital Design, three undergraduate level certificates in Interior Design and Architecture, and a graduate level certificate in Creative Entrepreneurship
- Morgan State offers programs to further assist their student development. **The Center for Continuing and Professional Studies** offers non-credit enrichment classes for their students. The topics for these classes are Conversational Foreign Languages, American Sign Languages, and Introduction for Computers for New and Adult Users.
- Towson offers an array of courses that are divided into 5 categories. All programs are offered face to face either as open enrollment to the public or customized for onsite delivery at either an organizations location or one of Towson University's locations. The

categories are as follows: Technical, Small Business/Management, Information Security, Medical, and Geographic Information Systems (GIS).

- **The Schaefer Center for Public Policy** at University of Baltimore has trained more than 4,000 state managers and has provided training to 55 senior managers in the Baltimore City Public School System. The **Weinberg Fellow Program** at University of Baltimore is a leadership development program for executive directors of community-based non-profit agencies that serve disadvantaged individuals. The program focuses on improving leadership and management skills, while providing participants with a great networking opportunity.
- UMBC Training Centers' non-credit professional development program offers courses in the following fields: Information Technology, Biotechnology, Engineering, Business, Allied Health, Test Preparation, and Custom Training for organizations. In addition, a partnership with Northrop Grumman has been established to provide a masters program in Systems Engineering.
- Villa Julie College's Career Services Office engages students and alumni in career planning processes to identify and reflect on their values, skills, and interests. Through personal guidance, support, and resources, students and alumni are able to align and articulate their personal and professional goals with give them a competitive edge in achieving career aspirations. 96% of graduates secure jobs within six months of graduation and an overwhelming number of graduates are employed by Maryland employers.

7.0 The Business and Economic Development Impact of Baltimore Collegetown Network Member Institutions

Colleges and universities play a critical role in supporting business and economic development in Maryland. Not only are Maryland's colleges and universities a primary source of the skilled and educated workforce that is one of Maryland's most important competitive advantages, they provide training and assistance to businesses, are a major source of new technological advances being commercialized by Maryland companies, and with the development of incubators and research parks, are directly involved in assisting the start-up and attraction of new businesses in Maryland. Much of Maryland's higher education infrastructure, including three of the state's four major research universities, are located in the Greater Baltimore area and are members of the Baltimore Collegetown Network.

This report will describe the contribution of the Baltimore Collegetown Network member institutions to economic development in the state and region in three major areas:

- the development and commercialization of new technologies;
- technical assistance and other services offered to businesses; and
- support for the entrepreneurship and the start-up and attraction of new businesses in the state and region

7.1 Research, Development and Commercialization of New Technologies

Colleges and universities are a central component of the national science and technology infrastructure. According to the National Science Foundation (NSF), colleges and universities perform 14% of all research and development (R&D) conducted in the United States, and perform 58% of the basic research (research conducted on new and early state technologies).[17] In Maryland, colleges and universities perform 16% of all R&D, and the NSF ranks Maryland 4th nationally in total R&D spending, fourth nationally in university R&D, and second nationally in research intensity.[18] [19] The Milken Institute ranks Maryland 4th nationally in terms of its science and technology infrastructure and also ranks the state 4th in the level of R&D activity.[20] Maryland's colleges and universities, along with the state's federal labs, are the core of the state's strong position in R&D and competitive national rankings for high technology development. As home to many of the leading public and private colleges and universities in the state, the Baltimore region and the Baltimore Collegetown Network's members, are the core component of Maryland's academic strength in promoting economic development. For example:

- Johns Hopkins University is ranked 1st nationally in National Institutes of Health research funding, 3rd nationally in biotechnology patents and 7th nationally in biotechnology publications;
- University of Maryland, Baltimore is ranked 25th nationally National Institutes of Health research funding; and
- UMBC ranks 3rd nationally in NASA funded research.

[17] http://www.nsf.gov/statistics/nsf07331/content.cfm?pub_id=3829&id=2
[18] Research intensity is ratio of R&D performed in a state to its Gross Domestic Product.
[19] http://www.nsf.gov/statistics/nsf07331/content.cfm?pub_id=3829&id=2
[20] http://www.milkeninstitute.org/publications/publications.taf?cat=ResRep&function=detail&ID=304

7.1.1 Research and Development Expenditures

The Baltimore Collegetown Network's member institutions account for the major share of university R&D conducted in Maryland. It was outside of the scope of this project to collect information on the total amount of R&D conducted by all colleges and universities in Maryland. This analysis, therefore, used available third party data available from the Association of University Technology Manager (AUTM) and the data collected in the survey of BCN members. This data includes all of the four major research institutions (JHU, UMCP, UMB and UMBC) as well as data from three other state universities and reported research expenditures from several smaller private institutions. This data includes the major research universities in the state, who account for the majority of research expenditures, but excludes other state universities, most importantly Salisbury ($3.5 million in research revenues in FY05) and Frostburg (no research funding data available), and all other private colleges and universities outside of the Baltimore region. Thus, this analysis represents the majority – but not the total amount, of university R&D conducted in Maryland. As presented in Table 18, Baltimore Collegetown Network member institutions account for 88% of total R&D, 88% of federally funded R&D and 95% of industry-supported R&D conducted at selected leading Maryland colleges and universities.

Table 18
Research Expenditures in FY 2005 by Selected Maryland Universities
(Millions of Dollars)

	Total Research Expenditures	% of Total	Federal Sponsored Expenditures	% of Total	Industry Sponsored Expenditures	% of Total
Total	**$2,480.6**	**100%**	**$1,961.5**	**100%**	**$206.5**	**100%**
JHU	$1,674.2	67%	$1,473.8	75%	$74.7	36%
UMB	$404.4	16%	$196.6	10%	$120.6	58%
UMCP	$309.9	12%	$228.0	12%	$9.9	5%
UMBC	$58.5	2%	$43.4	2%	$0.1	0%
Morgan State	$17.7	1%	$16.6	1%	$1.1	1%
Towson	$10.8	0.4%	$2.0	0.1%	$0.0	0%
University of Baltimore	$4.7	0.2%	$0.7	0%	$0.0	0%
All Other BCN Institutions	$0.5	0.0%	$0.3	0%	$0.1	0%

Source: AUTM, BCN, and the Jacob France Institute

7.1.2 Commercialization of New Technologies

As demonstrated in Table 19, the Baltimore Collegetown Members are the dominant generators of commercializable technology in the state. After a technology is developed through research at a university, the first phase of the commercialization process is the filing of an invention disclosure. If a technology is considered to have commercial potential, the university may seek to protect its intellectual property rights over the technology by filing for a patent. For a patent to be awarded, the technology must be judged to be novel, non-obvious, and useful. The

number of invention disclosures, patent applications filed, and patents awarded can all serve as indicators of the number of commercializable technologies being developed by universities in Maryland. The BCN members accounted for 82% of invention disclosures, 94% of patent applications, and 79% of patents issued to the major and selected Maryland research universities in FY2005.

Table 19
Patenting/Disclosure Activity in 2005 by Major Maryland Universities
(Number of Patents or Disclosures)

	Invention Disclosures	% of Total	New Patent Applications Filed	% of Total	U.S. Patents Issued	% of Total
Total	**666**	**100%**	**482**	**100%**	**112**	**100%**
JHU	393	59%	318	66%	81	72%
UMB	118	18%	100	21%	7	6%
UMCP	117	18%	31	6%	23	21%
UMBC	31	5%	30	6%	1	1%
Morgan State	4	1%	2	0.4%	0	0%
Towson	3	0.5%	1	0.2%	0	0%

Source: AUTM, BCN, and the Jacob France Institute

One of the principal economic development impacts of university research is through the commercialization of new technologies by the private sector. Once a new technology is developed in a university it is often licensed to a firm to be developed into a product. Universities can offer companies either exclusive or non-exclusive rights to develop particular technologies.

AUTM collects information on the licensing activities of major research universities.[21] The number of licenses and options executed, the number of active licenses and options generating revenues, and the royalty payments received can all serve as indicators of the levels of actual technology commercialization occurring at a university. As demonstrated in Table 20, BCN member institutions account for 93% of licensing royalties paid to the major Maryland research universities in 2005, 75% of the total number of licenses and options generating revenues, and 74% of all licenses and options executed in FY2005.

[21] None of the BCN respondents reported any technology licensing information in the survey, so this analysis relies on Association of University Technology Managers data.

Table 20
Technology Transfer Activity in 2005 by Major Maryland Universities
(Number of Licenses/Options and Thousands of Dollars)

	Adjusted Gross License Income Received $s	% of Total	License/ Options Yielding Revenues	% of Total	Licenses/ Options Executed	% of Total
Total	**$13,626,961**	**100%**	**397**	**100%**	**167**	**100%**
JHU	$12,369,870	91%	274	69%	94	56%
UMB	$251,388	2%	13	3%	23	14%
UMCP	$926,036	7%	101	25%	43	26%
UMBC	$79,667	1%	9	2%	7	4%

Source: AUTM, BCN, and the Jacob France Institute

7.2 Business Assistance Services

Baltimore Collegetown Network members provide business and technical assistance and consulting services to state and regional businesses. Five BCN members reported that they have specific programs to work with regional or state businesses. These programs are listed below. In addition to the formal business services programs described below, just about every Baltimore Collegetown Network member has formal or informal programs to place student interns in local area businesses. Businesses benefit from having the inputs of these student interns and the students get valuable real world experience.

- Loyola College in Maryland's **Center for Closely Held Firms** helps closely held and family businesses access to an extensive network of business contacts. As the area's only university-based center for closely held firms, it is also able to pool resources from the private, professional and academic areas to provide assistance from a variety of perspectives. The Center:
  - Presents seminars featuring leading experts in successfully managing closely held firms that provide a forum for the dissemination of ideas and the exchange of information;
  - Establishes special interest groups and programs for women business owners, minority business owners, and high tech company owners which meet periodically to explore, discuss, and share ideas;
  - Provides access to the expertise of specialists in accounting, law, employee relations, industrial psychology, strategic planning, insurance, marketing, finance and more; and
  - Provides members with opportunities to reach out and broaden their professional and social networks with a built-in community of peers for support and continuing dialogue.
- Loyola College in Maryland's **Lattanze Center for Executive Studies in Information Technology** was formed in 1987 as a joint venture designed to create a partnership between the information technology community and Loyola College's Sellinger School of Business. It supports funded research, symposia, and working papers to facilitate the sharing of new

knowledge about information technology and systems. Each year, Lattanze@Loyola College recognizes an IS Executive of the Year who personifies the values of Lattanze and the values of Loyola College in Maryland.

- Morgan State University's Earl G. Graves School of Business and Management's **Corporate Alliance Program (C.A.P.)** is a collaboration of progressive educators and business leaders to provide quality programs and experiences to Morgan State University business students and faculty. C.A.P. partners have priority access to students, faculty, and the dean for the purpose of fulfilling the organization's employment, training and research needs. C.A.P. partners have access to research using Morgan business students and faculty. Students and faculty gain valuable experience, while C.A.P. organizations receive high quality research.
- Towson University is home to the **Maryland Small Business Development Center** (SBDC) for Central Maryland. The SBDC provides a variety of management and technical assistance programs designed to assist new and existing small business owners. The SBDC is staffed with certified, professional business counselors who provide free one-on-one counseling services including strategic planning, business plan development, feasibility studies, needs assessments, financial analysis and financial projections, equity funding development, and management information systems. The SBDC also offers a comprehensive education and training program presented by local business leaders from many professional disciplines.
- The University of Baltimore's **Center for Global Business Studies** (CGBS) - provides education and training focused on the mix of business, cultural and language skills that students and managers must develop in order to be successful in a diverse global economy. Providing these skills serves to enhance existing academic programs at the University of Baltimore, and the CGBS also provides non-academic educational programs to both US and non-US business people.

7.3 Community Development Initiatives

In addition to the assistance provided to state and regional businesses, many BCN member institutions assist in general community development efforts in their home communities and across the region and state. Some examples of community development initiatives include are listed below.

- Coppin State University partners with the **Coppin Heights Community Development Corporation** to facilitate community revitalization in the West Baltimore community surrounding the university through the development of affordable housing, workforce development and educational programs.
- The University of Maryland, Baltimore School of Law operates the **Community Development Clinic**, where student attorneys in this clinical course represent nonprofit and community based organizations engaging in community redevelopment. As counsel, students aid clients in a variety of matters, including entity formation and operation, development of affordable housing and compatible real estate development activities, and economic development. Most clients are located in Baltimore City, but some are in suburban and rural Maryland.
- The University of Maryland, Baltimore School of Social Work's **Social Work Community Outreach Service** (SWCOS) has been working with individuals and communities to facilitate community development for over a decade. It implements a Neighborhood Fellows

program to work on neighborhood housing issues and received U.S. Department of Housing and Urban Development funding to prepare community development plans for the Monument-McElderry-Fayette communities.

7.4 Support for Business Start-up and Attraction

Baltimore Collegetown Network's member colleges and universities play an important role in both attracting businesses into the state and region and supporting the start-up of new businesses. The central role of colleges and universities in supporting economic development has been well established in the literature on state and local economic development. Colleges and universities support economic development indirectly through their role in providing a skilled and educated workforce (discussed in Section 6.0 of this report) or as the source of new technologies (discussed above). However, colleges and universities also play a more direct role in economic development. Many businesses favor locations in close proximity to colleges and universities where they can directly access technologies, students, and faculty. Major high technology regions, such Silicon Valley, Route 128, and Research Triangle Park, have developed in close proximity to leading colleges and universities. The presence of colleges and universities can also facilitate the development of "clusters" of related industries based on local research and educational capabilities.

Universities can also play a major role in facilitating entrepreneurship. Colleges and universities can directly promote the development of new entrepreneurial businesses established to commercialize university-developed technologies. Colleges and universities can indirectly support entrepreneurship through their contribution to a local culture of ideas and innovation described by economist Richard Florida in his work on the "Creative Class." Furthermore, many colleges and universities have created local programs to promote and support local entrepreneurship.

Four of Baltimore Collegetown Network's member institutions reported having programs to foster entrepreneurship or work with local entrepreneurs.

- The Maryland Institute College of Art and University of Baltimore jointly operate the **Creative Entrepreneurship Program** an innovative educational partnership offering essential business tools for the creative professional. Designed for visual artists, musicians, architects, interior designers, graphic designers, illustrators, actors, writers, craftspersons, and supporters of the arts, the program offers individual courses focused on fundamental areas of business management. Faculty from MICA and UB's Merrick School of Business offer their expertise on the unique concerns of creative professionals. Program courses emphasize basic skills needed to start, sustain, and grow an arts-based business. The course sequence leads to a Certificate in Creative Entrepreneurship.
- Morgan State University's **Entrepreneurial Development and Assistance Center** is designed to initiate an academic program in entrepreneurship. The center trains students in the theory and practice of business development and emphasizes services to local small businesses, which act as stimuli and provide on-site practical experiences for students. The center has provided instruction to more than 200 students in classes offered through the Entrepreneurship program and provided services to more than 100 local small businesses.
- The University of Baltimore's **Entrepreneurial Opportunity Center** (EOC) - is a growing campus-based venture designed to support local entrepreneurs as they continue to move into

the economic mainstream of the city, the region and beyond. The mission of the EOC is to improve the likelihood of sustained success for entrepreneurial businesses in Baltimore. Direct assistance and support is provided to University of Baltimore students interested in building businesses. Students are also able to gain practical experience in their chosen field by providing technical assistance to Baltimore entrepreneurs. In both cases, students receive a richer education along with direct experience that enhances future employment prospects. The EOC also provides non-academic educational programs to Baltimore business people and promotes and supports research on entrepreneurship. The EOC draws from the three schools of UB, as well as from other USM schools, and the business and economic development resources of the City of Baltimore and the State of Maryland. The EOC will have a direct and measurable positive impact on the business environment in Baltimore and the State of Maryland. Recently, the EOC hosted the 2006-2007 UB Entrepreneurship Speaker Series which showcases speakers and forums for helping entrepreneurs as they encounter problems inherent to running a small firms, including funding strategies, marketing tactics, retaining good employees, and succession plans.

- UMBC's Alex. Brown Center for Entrepreneurship was established in Spring 2000 through a gift of $1 million from The Alex. Brown Foundation. It also received a $2 million grant from the Kauffman Foundation, a national foundation focused on encouraging entrepreneurship. The center offers the following programs:
    - **ACTiVATE** - Achieving the Commercialization of Technology in Ventures through Applied Training for Entrepreneurs is in an entrepreneurship development program focused on technology commercialization. Participants work with technology innovations from universities in the region and turn them into technology-based, start up companies. ACTiVATE is a customized program that addresses the unique needs of women interested in starting technology companies. Since 2005, the ACTiVATE program has had 79 women graduate from its program, with 17 new companies formed or products developed by graduates with the potential for six more in the future;
    - **Smartaccelerator[SM] for Technology Entrepreneurs** is a multi-day program designed to accelerate the growth and development of high tech start-up companies through training, networking, introductions to funding sources and technical assistance. It allows CEOs and their senior management teams to listen and learn first-hand from industry experts on how to secure funding and grow their business to the next level. Customized programs targeting the unique challenges faced by BioTech and Information Technology companies, as well as general technology companies, are available; and
    - The **Entrepreneurship Speaker Series** provides a platform for successful entrepreneurs to candidly share their experiences and insights with UMBC students, faculty, alumni and the Baltimore business community. The series highlights experiences, lessons learned and unique issues and challenges faced by entrepreneurs in the creation of a new enterprise.

7.4.1 University Research Driven Companies

Not only are Baltimore's colleges and universities an important source of technology for existing companies through their technology transfer and commercialization activities, they are

important generators of new companies, formed by university faculty and researchers to commercialize new technologies developed on-campuses across the region. According to the Association of University Technology Managers, 133 Maryland companies have been formed to commercialize university discoveries and Maryland's four major research universities since 1980.[22] Baltimore's three major research universities (JHU, UMB and UMBC) accounted for 88 (66%) of these companies.

Table 21
The Total Number of Start-Up Companies Formed
To Commercialize University-Generated Technology
FY1980-2005

Institution	# of Companies	% of Total
Total	**133**	**100%**
JHU	66	50%
UMB	20	15%
UMCP	45	34%
UMBC	2	2%

Source: AUTM

The Maryland Technology Development Corporation (TEDCO) conducted studies of the genealogy – or the background of Maryland high technology companies in the biomedical and health informatics; bioscience and medical instruments; communications equipment; and information security sectors.[23] These reports found that:

- The founders of 29 of Maryland's 142 home-grown biomedical and health informatics companies came out of academia;
- The founders of 55 of Maryland's 274 home-grown bioscience and medical instruments companies came out of academia – with 34 from JHU and 22 from University of Maryland affiliated institutions;[24]
- The founders of 7 of Maryland's 80 home grown communications equipment companies came out of academia; and
- The founders of 2 of Maryland's 37 home-grown information security companies came out of academia.

[22] No comparable data exists for all BCN members and no other BCN members reported any new company start-ups in the survey.
[23] http://www.marylandtedco.org/publications/genealogystudies.cfm
[24] One company had founders from both JHU and UMB.

While these TEDCO reports did not list how many of each of these companies were founded by faculty or researchers from Maryland colleges and universities, many, if not most were founded out of or attracted into the region because of the high quality of state and regional higher education institutions. Moreover, many of the founders of companies in all of the four sectors received their degrees from Maryland institutions. Based on these statistics, it is clear that higher education institutions play a vital role in the vitality of Maryland's high technology sector, and the Baltimore region is home to three of Maryland's four major research universities.

7.4.2 University Research Parks

The members of the Baltimore Collegetown Network also facilitate economic development in the region and state through the development and operation of research parks. University research parks can serve as a central element in the development of a region's economy that attracts the high technology businesses. According to the October 2007 Association of University Research Parks *Characteristics and Trends in North American Research Parks: 21st Century Directions* report - Research parks are real-estate developments in which land and buildings are used to house public and private R&D facilities, high-technology and science-based companies, and support services. By providing a location where researchers and companies operate in close proximity, research parks create an environment that fosters collaboration and innovation and promotes the development, transfer, and commercialization of technology. This report found that University Research Parks:

- Are emerging as strong sources of entrepreneurship, talent and economic competitiveness;
- Have become a key element of the technology infrastructure supporting the growth of today's knowledge economy; and
- Generate an average of 2.57 jobs in the economy for each job in the park.

All of Maryland's four major research universities either have or are developing research parks and three of these parks are under development in the Baltimore region by Baltimore Collegetown Network members. These three parks are:

- **bwtech@UMBC** is a 71-acre research and technology community at the University of Maryland, Baltimore County (UMBC). The research park has a total development capacity of up to 350,000 square feet of office and laboratory space. The park will ultimately comprise five new state-of-the-art buildings occupied by research and technology firms. The firms have access to university expertise, students, technology, programs and facilities. A 2006 study of the economic impact of the companies located in the bwtech@UMBC park found that the research park creates 1,202 jobs and $121.1 million in business sales in the Baltimore region.
- **The Science + Technology Park at Johns Hopkins** is a 31 acre redevelopment project that will offer 1.1 million square feet of lab and office space meeting the requirements of emerging and established research organizations access to Johns Hopkins scientists and facilities as well as new housing, shops, restaurants, parking, and other amenities. The first building is under construction and will consist of a 277,496 square foot building that combines office, laboratory and supporting retail space.

- **The University of Maryland, Baltimore BioPark** will consist of nine buildings and a total of 1.17 million square feet of rentable space. The first building has been completed and is fully leased and the construction of the second building nearing completion. A 2006 analysis conducted by the Jacob France Institute for Wexford Equities found that the UMB BioPark will directly generate $841.4 million annually in local economic activity and support 4,145 jobs as a result of the companies locating in the park. Including the economic multiplier effects, the total economic impact of the operation of the UMB BioPark will be $1.3 billion and the park will generate 7,838 jobs earning $343.7 million in salaries and wages.

7.4.3 University-Based Incubators

According to the Maryland Technology Development Corporation, Maryland is currently home to eighteen business incubators with a further three under development. Four of these incubators are located at four-year colleges and universities – including three in the Baltimore region: the Emerging Technology Center @ John's Hopkins Eastern, the Business Globalization Center at Towson University, and bwtech@UMBC.

- **The Emerging Technology Center @ Johns Hopkins** Eastern is a fully wired, 45,000-square-foot center located minutes from Johns Hopkins University in a newly renovated building that formerly was the site of Eastern High School. It focuses on commercializing innovative technology from Hopkins and other regional research institutions. ETC@ Johns Hopkins Eastern offers flexible leases, shared basic services and equipment, technology support services, and on-site management. It also offers opportunities for creative collaboration between resident companies and JHU faculty. The ETC provides facility-oriented services – including reception, infrastructure, and support services – in vibrant, stimulating spaces. A total of thirteen companies have graduated or moved from Emerging Technology Center @ Johns Hopkins Eastern – one moved to the other Emerging Technology Center @ Canton, five have since closed, and seven are still in operation.
- **The Business Globalization Center** at Towson University is a 5,100 square foot incubator for product-oriented Maryland companies and international companies seeking to market their products in the Mid-Atlantic region. The Center will offer access to Towson faculty and students and offer workshops and other resources to assist companies.
- **bwtech@UMBC's Incubator and Accelerator** is home to more than 25 start-up and emerging high-tech and bioscience companies. The incubator also operates an Idea Lab to help UMBC students and faculty develop businesses. It has graduated more than 30 companies from the incubator program and has accommodated 90 tenants since its inception. Two of the most successful are Celsis, winner of a Maryland Technology Development Corporation (TEDCO) Award as Best Incubator Graduate, and Receptor Biology, which was sold to another life science company. The companies at bwtech@UMBC's Incubator and Accelerator provide over 250 jobs, including more than 50 employed UMBC students. Most of the companies work closely with UMBC faculty and staff. bwtech@UMBC's incubator staff has successfully helped companies acquire Small Business Innovation Research (SBIR), Maryland Technology Development Corporation (TEDCO) and Maryland Industrial Partnerships (MIPS) funding.

Furthermore, numerous BCN member institutions work with incubators both in the region and across the state. Some examples of business interactions with business incubators include:

- The University of Maryland, Baltimore School of Law operates the **Maryland Intellectual Property Legal Resource Center**, located in the Maryland Technology Development Center in Montgomery County; the Maryland Intellectual Property Research Center (MIPLRC) educates entrepreneurs, law, and business students, and the community about the legal aspects of Intellectual Property. The MIPLRC can educate entrepreneurs about, and connect them with, legal service providers. As part of its mission, the MIPLRC also provides legal services, primarily through a law school student-staffed legal clinic, under the supervision of a licensed patent attorney and affiliated faculty and area specialists.

8.0 Selected Public Service, Educational, Cultural and Community Contributions of Baltimore Collegetown Network Member Institutions

Beyond the primary role that the colleges and universities play in creating a skilled and educated workforce, the schools are active in improving the quality of life for residents, community groups, and a variety of others within the region. These programs, centers, and groups are focused on assisting local government; assisting primary and secondary education; hosting and providing cultural, educational, sporting, and public and community health events and programs; and providing community and volunteer service. A selection of the many community programs offered by BCN that were identified in the survey is listed below.

8.1 Service to Local Government and Community Organizations

- CCBC is home to the Police Academy and to training facilities for the Maryland Department of Transportation Agency. The Aviation Management and Air Traffic Control Programs provide training, simulators, and continuing education for and agencies concerned with BWI.
- The College of Notre Dame provides opportunities for faculty, staff, and students to participate in volunteer or community service. For instance, through the Human Resources Department, faculty and staff are linked to programs such as Susan G. Koman Breast Cancer Foundation, Boys Hope/Girls Hope of Baltimore, American Cancer Society and the United Way. The Community Organization of Students has spear-headed programs that include canned food drives, penny collections, holiday parties, and gatherings for needy children and senior citizens, programs to improve the environment, blood drives, and relays for life and walks for cancer research.
- Coppin State University's **American Humanics** program enables university students to learn and apply leadership skills in the field of non-profit agencies. This program not only rewards students with the opportunity to gain experience in non-profit management but also rewards communities with the knowledge gained.
- The **Old Goucher Neighborhood Collaborative** at Goucher College is an integration with local non-profits where the college shares a space with three established community organizations—Community Law in Action, Wide Angle Community Media, and the Megaphone Project. Goucher students work in conjunction with these groups to contribute to the revitalization of the neighborhood through services and programs targeting the specific needs of its residents. This space serves as an off-site headquarters for Goucher's service-learning programs, and connects students with a center that provides after-school and adult-education programs for local residents and other organizations. Through Goucher's Community Auxiliary for Service, students are given opportunities to volunteer for a variety of organizations. Students provide comfort to people living with AIDS at the Don Miller House, they feed homeless at Our Daily Bread soup kitchen, and they build houses with Habitat for Humanity.
- The Maryland Institute College of Art participates in the following partnerships that help to revitalize neighborhoods:
    - Midtown Benefits District;
    - Mayors Strategic Neighborhood Action Plan;
    - Midtown Development Corporation;

- Mount Royal Improvement Association;
- North Charles Community Association;
- Central Baltimore Steering Committee; and
- Station North Arts District.

- Morgan State University supports the **Northeast Development Alliance (NEDA)** which is a community development corporation servicing the neighborhoods near the University. Morgan State contributes both financially to the organization and provides office space. A $600,000 proposal in being requested by the Department of Housing and Urban Development's Historically Black Colleges and Universities Program to address community, education, economic, and housing development concerns in the northeast Baltimore area.
- A major organization at Towson is the **Regional Economic Studies Institute**, which interacts with the Maryland Department of Human Resources, Maryland State Department of Assessments and Taxation, Maryland Department of Labor, Licensing, and Regulation, Maryland Department of Business and Economic Development, Montgomery County Maryland-National Capital Parks and Planning Commission, and the Tri-County Council of Western Maryland.
- University of Baltimore's **Baltimore Neighborhood Indicators Alliance – Jacob France Institute (BNIA-JFI)** is an organization consisting of diverse groups committed to promoting, supporting and helping people make better decisions using accurate, reliable, and accessible data and indicators to improve the quality of life in Baltimore City neighborhoods. This unique alliance builds on and coordinates the related work of citywide nonprofit organizations, city and state government agencies, neighborhoods, foundations, businesses and universities to support and strengthen the principle and practice of well informed decision making for change toward strong neighborhoods, improved quality of life, and a thriving city. BNIA-JFI staff serves on several of the Baltimore City Mayor's committees and provide research support to several city government agencies.
- The University of Baltimore's **Schaefer Center for Public Policy** is the official provider of Managing for Results training for the state of Maryland. The center's mission is to serve the public and non-for-profit sectors of Maryland by conducting program evaluations, performing policy analysis, engaging in survey research and conducting management training programs. The emphasis of the Schaefer Center is on applying the knowledge of the university community to real-world issues.
- The **Center for Community Technology Services (CCTS)** at University of Baltimore aims to strengthen the ability of the Baltimore region's nonprofit organizations to use information and communication's technologies effectively and to successfully integrate new information technologies into their services and operations. This service assists hundreds of small and medium-sized nonprofit organizations in the Baltimore region in improving program delivery and operational effectiveness through consistent, cost-effective and supportive planning. The center is dedicated to helping agencies expand their abilities to strengthen their impact on the communities they serve.

- The University of Baltimore's **Coordinated Community Outreach Group (CCOG)** was created to develop and implement a comprehensive community engagement and outreach plan. The CCOG team initiated a new community service opportunity allowing members of the UB community to work as a group at a Baltimore City organization.
- UMBC's **Center for Health Program Development and Management** is a multi-faceted health services research organization. Under contract with Maryland Department of Health and Mental Hygiene (DHMH) the center has become nationally recognized for its work in helping Maryland control the costs and improve the quality of health care in the state.
- UMBC's **Choice Program**, through a contract with the Department of Juvenile Services, brings a community-based, family centered case management approach to serving hundreds of at-risk youth.
- The University of Maryland, Baltimore - School of Law's **Center for Dispute Resolution (C-DRUM)** works directly with Baltimore City neighborhoods developing a replicable conflict resolution program that includes the creation of a peer mediation program and is understood and utilized by students, faculty and staff.
- Villa Julie has students participating in internships and cooperative education experiences in county government and non-profit agencies.

8.2 Support for Primary and Secondary Education

The Baltimore Collegetown Network plays a vital role in supporting primary and secondary education in Maryland. Not only did Baltimore Collegetown Network members graduate nearly 3,000 students with education degrees, meeting 61% of the State's demand for teachers, BCN members have created numerous programs in the primary and secondary educational areas that aid in the initial growth and development of future college graduates. Some of the programs and events devised by the Collegetown Network are described below.

- CCBC provides a wide variety of Science and Academic Camps that provide enrichment opportunities to a large number of elementary and high school students of Baltimore County. CCBS also provides continuing education workshops for the Baltimore County Public Schools.
- Students of the School of Education at the College of Notre Dame are actively involved in activities to improve local primary and secondary education. The faculty and professional development school staff work together to achieve the shared goal of improved student performance through research-based teaching and learning. Several examples include providing professional development to elementary and middle school teachers in mathematics instruction and offering tuition-free, three-credit graduate courses to faculty in leadership, mentoring, and technique work, and serving as members on school improvement teams.
- Coppin State University fully operates and manages Rosemont Elementary School, a Baltimore City Public School which once produced low test scores but now boasts some of the highest test averages within the city. CSU also operates a high school on its main campus know as the Coppin Academy. Students operate under strict academic guidelines

and are exposed to highly-specialized academic instruction. The academy enrolls over 200 students and plans to increase enrollment in the future.

- Goucher's **M.A.T. program** works in partnership with Professional Development Schools in Anne Arundel, Baltimore County, and Baltimore City public schools offering reduced tuition to teachers in these systems and placing student teachers from Goucher in their classrooms for year-long internships. Additionally, the **Teachers' Institute** at Goucher offers additional professional development opportunities for certified teachers, including on-site sessions during the summer and online courses throughout the year.
- Johns Hopkins University offers numerous programs to support and assist primary and secondary education in the city, region and state. Some examples are listed below.
    - The JHU **Tutorial Project** provides free tutoring for more than 100 elementary school children, grades 1-5, each academic semester. The program has been in continuous operation for 48 years. Johns Hopkins undergraduate students are matched with children from Baltimore City and a total of 120 staff and tutor volunteers are trained by professional educators. Test results are used as the basis for providing individualized instruction to each participant.
    - JHU Center for Social Concern supports a summer math program, **Number Playground**, which serves 40 elementary-age children free-of-charge. America Counts, a Federal Work-Study program supports the 12 student teachers for Number Playground.
    - The JHU **Public School Partnership** partners with several elementary, middle, and high schools near the East Baltimore campus. Through these relationships, JHU students create special events and programs. At Dunbar High School, JHU students mentor Dunbar students and encourage them to enter the health professions. The **Incentive Mentoring Program** is an after-school program for high students that are not performing at a high level. At Dunbar Middle School, JHU students help to teach sex education classes. At Dr. Rayner Browne Elementary School, students provide tutoring and mentoring. Additionally, a **Connection** team worked to create an after-school curriculum for the children at the school, including tobacco prevention and nutrition programs. With Tilghman Elementary School, JHU students have taught in the classrooms and outside of the classroom.
- The Maryland Institute College of Art supports primary and secondary education through several programs, including:
    - **SuperKids Camp**- program consisting of three enrichment units, map-making, mural making, and book-making, designed to support literacy training for approximately 60 third and fourth graders from Baltimore City.
    - Work closely with Baltimore Regional ACT-SO program of NAACP to provide scholarships to high school students who attend the Young People's Studio Program during the spring semester.
    - Partnership with Mount Royal Elementary/Middle School to assist them with their interior and exterior structure, as well as their curriculum.

- **MICA Community Arts Partnerships** (CAP) interns partner with MICA's Master of Art in Community Art grad students-in-residency and work through the arts in the Baltimore community at large.
- The **Center for Summer Learning** hosts an eight week program designed to merge art with literacy at three Baltimore City schools and at the central YMCA.

- The **Center for Excellence in Mathematics and Science Education** at Morgan State University aims to increase the quantity and quality of mathematics and science teachers in Maryland in order to ultimately strengthen instruction in elementary, middle and high school levels. With this center, businesses and industries are encouraged to cooperate and support area public schools.
- Towson University extends its efforts to assisting primary and secondary education through several programs, including.
  - **Women's Enterprise Network** a non-profit organization that provides elementary and junior high school students with opportunities to tour its campus connect with mentors; hear from other students about their college experiences, etc. This is organized through the Women's Center - Women in Leadership program.
  - **SAGE (Students Achieving Goals through Education)** works with the College Bound program (a program aimed at getting students into college) to encourage students to consider college as an option.
  - **Project L.O.U (Lean on Us),** a student led group at TU hosts a mentoring and tutoring program at St. Ambrose Community Center for children in the northwest community of Baltimore City.
- The **Truancy Court Program** at the University of Baltimore pairs judges, counselors, and education specialists with truant students, service providers, their parents, teachers, and principals in an enhanced effort to improve overall school attendance. The program provides UB law students with practical, hands-on learning experiences and serves as a model for city school systems nationwide. Other programs in this area that UB has established include:
  - The **Center for Student Involvement** presents workshops for UB's Youth Leadership Academy. Focusing primarily on Mount Royal Middle School, eight workshops are presented to students who have shown interest in leadership development;
  - The **Rosenberg Center for Student Involvement** expanded its community outreach with a grant from the Baltimore City Office of the Mayor for initiatives focusing on middle school youth. The program consists of leadership workshops, field trips, and college-readiness activities; and
  - **Baltimore Rising Initiative** aids troubled youth in Baltimore by pairing them with mentors who serve as positive role models.
- The University of Maryland, Baltimore offers numerous primary and secondary education programs. These include:

- **A Bridge to Academic Excellence** is a program that allows University of Maryland, Baltimore students to provide tutoring to 61 students from 22 different high schools on Saturday mornings;
- The University of Maryland, Baltimore's School of Nursing runs school-based wellness centers where children in grades K-12 are provided with access to a variety of health care services. The wellness centers are located in Baltimore City, Baltimore County, Caroline County, Dorchester County, Harford County, and Talbot County;
- The School of Pharmacy has a mentoring program with local high schools and donates scientific equipment to local schools; and
- The School of Medicine runs the **Young Scientist Days of Discovery Program** where local high school students are encouraged to consider the possibility of a career in health sciences research or other health professions.

- The University of Maryland, Baltimore County is especially committed to the development of effective K-16 initiatives. One such initiative is the **STEM Education Project** involving UMBC, Baltimore County Public Schools, and the National Science Foundation to strengthen engineering student achievement and teacher proficiency in science, technology, engineering, and mathematics.
- Villa Julie College participates in the **Maryland Professional Development School Network** which connects Maryland colleges and universities and their local school system partners in and effort to implement the *Redesign of Teacher Education in Maryland* through professional development schools (PDSs). Villa Julie College currently works with 11 PDS schools.

8.3 Cultural Events, Performances or Programs

Baltimore Collegetown Network members make important contributions to the cultural vitality of the region and state. BCN members host cultural events and performances, many of which are open to the public, featuring regionally and nationally renowned performers and talent as well as students. Some examples of BCN member cultural activities are presented below.

- Faculty, staff, and students at College of Notre Dame participate in numerous public programs to increase cultural vitality including:
  - Public lectures in observance of International Education Week;
  - Cultural events celebrating African American history month and the Chinese New Year;
  - A campus-wide observance of women festival during International Women's Day; and
  - Numerous concerts and exhibits free to the community.
- All major cultural programs at the Coppin State University are open to the general public. Some events that have taken place were Three Mo' Tenors, Ramsey Lewis, and the Lion King. These concerts were affordable for community residents and others.

- Goucher College strives to be a major source of educational and cultural programming for the Baltimore-Washington region, and its calendar of events is packed throughout every academic year. These programs include:
    - The **Kratz Center for Creative Writing** brings notable writers to the campus at least twice a year for public readings and lectures;
    - The **President's Forum** brings heavyweight speakers to the college to present public lectures and Q&A sessions on current events and critical issues. Recent visitors in that series have included former Speaker of the United States House of Representatives Newt Gingrich, former CBS News Anchor Dan Rather, and Barbara Mikulski, U.S. Senator for Maryland;
    - **Goucher's Arsht Center for Ethics and Leadership** has presented public appearances by former U.S. Supreme Court Associate Justice Sandra Day O'Connor, First Amendment lawyer and free-speech defender Floyd Abrams, and world-renowned journalist Bob Woodward;
    - Goucher presents two major concert series each year. The Henry and Ruth Blaustein Rosenberg Lecture-Performance has been a Baltimore tradition for nearly 50 years, bringing world-famous musicians to the stage of Goucher's 1,000-seat Kraushaar Auditorium for free public concerts followed by Q&A and autograph sessions; and
    - The college's **Avery Fisher Music Residency** presents up-and-coming musicians in free performances and master classes open to young music students from the area.
- Goucher's on-campus venues serve as important resources to Baltimore's performing-arts community, including the:
    - Baltimore Chamber Orchestra;
    - Baltimore Choral Arts Society;
    - Baltimore Actors Theatre;
    - Baltimore Ballet Company and School;
    - Handel Choir;
    - Chorus of the Chesapeake;
    - Harbor City Chorus;
    - Chesapeake Gem and Mineral Show; and
    - Maryland State Boy Choir Festival.

  The Events Office is responsible for bringing 98,029 visitors to campus each year, including 1,534 out-of-state visitors, some of whom stay overnight.
- Johns Hopkins University offers an array of cultural and fine arts programs open to the community, including, Clowning Around Baltimore, CSC Dance Program, Margaret Brent Orchestra, Maryland School for the Blind Outreach, and Patchwork. These programs incorporate music and art into the lives of those in Baltimore City.

- Maryland Institute College of Art offers many cultural and educational events and performances to the public. Some of the performances are as follows:
    - film series
    - Student-run Channel Organix video presentations;
    - Mixed Media Lectures;
    - Symposiums; and
    - Bolton Hill Architectural meetings.
- The **Murphy Fine Arts Center** at Morgan State offers concerts, art exhibits, plays, and community sponsored activities regularly to the public.
- Area schools and community members are welcome at all times to attend events at Towson University – for example events during Black History month and Women's History month are open to the public.

  Towson has several speakers, workshops and programs that are open to the community. For example the **International Student Association** holds an annual International Festival and the **Center for Student Diversity** holds a week-long celebration of diversity during the Cultural Kaleidoscope.

  The **Spanish Honor Society** sponsors a major cultural event each semester that draws several members of the greater Towson community. Each event focuses on a Spanish-speaking country or region and provides authentic food and entertainment representative of that country or region. Presentations, posters, and cultural displays are also set up in order to inform participants of important aspects of the history, society, and culture of the country or region being represented.
- The UB campus presents a series of public admission cultural activities year-round. A "Spotlight on UB" concert is performed highlighting various musical styles ranging from BSO chamber music to folk to children's performances.
- The Rosenberg Center for Student Involvement at UB has partnered with Audrey Herman Spotlighters Theater in Baltimore to offer small productions, dramatic readings on UB's campus, and discounted tickets to Spotlighters' productions.
- UMBC is home to a lively and diverse series of performing arts and exhibition events. For example, UMBC operates two art gallery exhibition spaces—the **Center for Art, Design and Visual Culture**, dedicated to the study of contemporary art and culture, and the **Albin O. Kuhn Library Gallery**, dedicated primarily to the exhibition of photography. In addition, UMBC annually presents more than one hundred concerts and performances including noted guest artists, faculty performers, ensembles, theatre performances, and dance performances. In addition, UMBC's Humanities Forum presents 12 lectures in the humanities each year.
- Villa Julie College offers year round performances and exhibitions which are always open to the public. These cultural activities include artistic showings at the Art Gallery; performances by the student, faculty, and local resident comprised Greenspring Valley

Orchestra; performances by the VJC Chorus and Jazz Ensemble; numerous theatrical productions; and a Baltimore Speaker Series.

8.4 Educational Events or Programs

Baltimore Collegetown Network members also host important educational events and programs that can educate and inform both students and local residents on key issues and topics. Some examples of BCN member educational activities are presented below.

- Over 39,000 citizens take continuing education courses at CCBC each year.
- The College of Notre Dame offers various public lectures. Some of these lectures include: The Sister Virginia Geiger Lecture on Ethics and Society, The Charles J. Busta Lecture in Business, The Morrissy Lecture on history, economics, or sociology, and The Baldwin Lecture in the Humanities.
- The **Reading Explosion Program** at Coppin State University offers a 'sleep-in' at the university where students from local elementary schools can compete for three cash prizes by reading as many "approved' books as they can under the supervision of teachers and administrators at their school. They also participate in a contest to determine the best oral and written report on their favorite book.

  Three Saturdays a month during the school year students come to Coppin's campus to get tutorial assistance, S.A.T. Prep or cultural enrichment. There is also a component that provides building social and academic skills, including, self esteem, time management, and test taking strategies.
- Goucher College's Kraushaar Auditorium serves as a primary venue for the programming of many local elementary and middle schools, through the productions of local, regional, and national children's educational theater organizations, including:
  - American Theater Arts for Youth;
  - Art Onstage;
  - Arts Power;
  - Chamber Theatre;
  - Learning on Stage;
  - Paper Bag Players; and
  - TheatreWorks USA.
- Johns Hopkins University is active in assisting a variety of Baltimore residents in tutoring and mentoring. Boot up B'More, Hampden Tutorial Project, NSCS, GED Tutoring, and Science Pros are a few of the many educational programs that Hopkins offers. The programs focus on diverse topics such as technology, science, reading, math, and GED tutoring. In addition to focusing on certain topics, many programs concentrate on specific groups of people. Best Buddies and Jail Tutorial seek to help those with intellectual disabilities and inmates in Baltimore City prison respectively. Other groups offered include: Circle K, Friends of Baltimore Schools, Girl Scouts, and the Johns Hopkins Tutorial Project.

- Johns Hopkins University's **Jail Tutorial Project** provides tutoring to inmates at the Baltimore City Prison, typically at the Women's Detention Center. Students at Johns Hopkins are given the opportunity to put their education to use in a constructive and meaningful setting by tutoring female inmates in G.E.D. work and other pursuits once or twice a week.
- Morgan State University offers an array of events and programs that aid in the education development of local students. These include:
    - Summer High School internship program;
    - Annual mathematics, science, and engineering fair;
    - SAT preparation;
    - Maryland Functional Testing;
    - W.E.B. Dubois mathematics and science performance program;
    - Women in science engineering program; and
    - NASA engineering challenge program.
- Black Student Union (BSU) of Towson University hosts **Shadow Day** for students from area high schools where members host students for the day. It also hosts **Sleeping Bag weekend** where approximately 25 area high schools stay with students and are shadowed and mentored for the weekend about the importance of college..
- The University of Baltimore campus presents a series of public admission educational activities, such as lectures, conferences, computer mini courses, mentoring programs, and library services. Local community members are frequently invited to lectures and other large events on campus. Residents are also invited to participate in our leadership certification program for free.
- The annual **FIRST LEGO League Maryland State Tournament**, hosted by UMBC, is an international robotics program intended to encourage enthusiasm for discovery, science, and technology in kids ages 9 to 14. Additionally, UMBC's Center for Women and Technology presents the annual Computermania Day, offering middle school girls a day of hands-on activities designed to excite them about information technology fields.
- Villa Julie College offers many lectures and speakers that are advertised in media outlets to attract local residents. A yearly undergraduate conference is sponsored by Villa Julie in which students from area colleges make presentations on various topics.

8.5 Public and Community Health Programs

Baltimore Collegetown Network members operate programs that provide access to health care services and information to local residents, many of whom lack access to adequate health care. These programs serve the dual mission of improving education and training, by providing hand-on experience for students, and improving both the general health and access to healthcare services in the state and region. Some examples of BCN member public and community health programs are presented below.

- The Coppin State University **Community Health Center,** run by the School of Nursing provides quality health care that is sensitive to societal needs, demands, and values with

providers that are culturally sensitive and responsive to changing trends and needs of the inner city. Residents of the community as well as campus members are given the opportunity to walk-in or visit by appointment for health care and other treatment options. The **Kinship Care Resource Center** provides information and referral to kinship care families in a centralized location that serves the entire State of Maryland. The center aims to stabilize families by providing information on accessing needed resources.

- Johns Hopkins University **Baltimore Rescue Mission Clinic** is a weekly clinic that operates in a homeless shelter in East Baltimore. Undergraduates and medical students work together under the supervision of a medical doctor to take patient histories, formulate diagnoses, and learn more about primary care medicine and the underserved population.
- Johns Hopkins University **SALUD** is a student organization that provides advocacy and support for Hispanic and minority health care in Baltimore City. It is sponsored by the JH Center for Social Concern, the JH Medical School, and the JH School of Public Health. The purpose of this organization is to alleviate the cultural and linguistic barriers that many Hispanics in Baltimore encounter when seeking medical care. SALUD targets two increasingly interacting populations: First, SALUD assists the Hispanic community through health fairs, health education, and community outreach. Second, SALUD supports healthcare providers through cultural competency training and interpretation services. SALUD is composed of over 50 volunteers consisting of undergraduate, graduate, public health, and medical students. They work with partner institutions throughout Baltimore including the Baltimore City Health Department and the Hispanic Affairs Office.
- The **SHARED Experiences Project** at Morgan State University is a collaborative effort between the Prevention Sciences Research Center and the Department of Public Health. The objectives are to increase students' interests and participation in service-learning experiences that address mental health and substance use/abuse issues by integrating coursework and experiences in the field and to provide at least ten community-based, service-learning experiences to students who will work with community stakeholders in conducting research and treatment strategies.
- Towson University is active in promoting public and community health programs. Some of their efforts include:
    - **The Speech, Language Hearing Center** at Towson University is a fully functioning clinic that provides services to over 300 members of the community each year; and
    - The **Stroke Survivor's Program** provides monthly meetings for stroke survivors and their caregivers. This program is co-facilitated by a speech-language pathology faculty member & an occupational therapy faculty member.
- As the state's flagship public health sciences university, the University of Maryland, Baltimore operates several clinical programs that provide access to various services to local, regional, and statewide residents. These clinics are associated with particular

schools of the university and are operated by students and faculty advisors. Examples of these clinics are presented below.

- The School of Dentistry's teaching clinics treat more than 25,000 patients per year. The school is the largest provider of dental services for Medicaid beneficiaries and HIV-infected persons in the state.
- **The Western Maryland AHEC**, based in Cumberland, is staffed in part by University of Maryland, Baltimore medical students, who complete six to eight week clinical rotations at the center.
- The **Care Clinic**, run by both the Schools of Medicine and Social Work, ensures that optimal mental health treatment is given to children and families affected by physical or sexual abuse, or exposure to domestic violence.
- The **Pediatric AIDS**, managed by the School of Medicine, provides comprehensive medical and nursing care and social work services of the highest quality to children and families infected with and affected by HIV.
- With the **Clinical Law's AIDS Clinic**, students provide legal services to HIV and indigent individuals dealing with issues of first impression and a range of other legal issues including housing and family law.
- In the **Health Law Clinic**, law students represent indigent clients in cases involving accesses to or payments for health care. Clients have included low-income families, children and adults with disabilities, homeless persons, and elderly.

- **Nursing and Medical Technology programs** at Villa Julie prepare students to work in many of the local hospitals and healthcare facilities upon graduation. Villa Julie's Medical Technology programs are now linked to Lifebridge Health Medical System. The mission of this program is to graduate competent, ethical professionals with the skills and knowledge necessary for medical technologists.

8.6 Sporting Events and Facilities

Baltimore Collegetown Network members operate sporting facilities often used by the public as well as host major sporting events and teams attended and supported by the public.

- Over 500,000 citizens use CCBC campuses and facilities for events including youth and adult sports leagues, high school football, basketball, soccer, baseball and lacrosse matches, camps, and swim meets.
- The College of Notre Dame participates in sports such as basketball, field hockey, lacrosse, soccer, swimming, tennis, and volleyball. The three largest sports based on average attendance are basketball, volleyball, and soccer.
- Goucher College's pool sells memberships to the community. They also rent the pool, gym, track, and fields to outside groups.
- Loyola College has a Fitness and Aquatic Center which students, faculty, and staff, as well as local residents can join.

- Morgan State University's facilities can be rented by local residents and organizations for community sports tournaments. The University also hosts a Junior Olympic Track and Field competition in which over 6,000 athletes' participated and over 14,000 spectators attended.
- Beyond its sports teams, Towson University hosts several sporting programs and clinics. Examples of these programs include:
    - Home athletic events;
    - Children's clinics in many sports throughout the year;
    - Tigerfish Aquatics Program- lessons and competitive swim program for children;
    - Masters Swimming Program - swim program for adults;
    - Time Out for Sports Volleyball Club Program- Practices and competitions for youth programs;
    - Field Hockey Olympic Development Program;
    - Special Olympics Programs;
    - Senior Olympics Programs;
    - High school athletic events and championships (occasional and annual events);
    - High school marching band competitions; and
    - Bayhawks Home Games 2004-2006.
- UMBC is home to the **Retriever Activities Center** offering modestly priced memberships for fitness and pool facilities. In addition, UMBC participates in numerous collegiate athletics including 20 varsity teams and 24 club teams. Known mainly for its basketball and lacrosse teams, each game attracts around 1,000 to 3,500 attendees. Community members are encouraged to attend as thousands of free tickets for games are distributed to numerous elementary and middle school students.
- Villa Julie College participates in NCAA Division III Athletics. Athletic contests are open to the public and occur across various venues in Maryland. Numerous athletic teams have played in conference championships, NCAA championships, as well as in-state rivalry competitions. In addition to athletics available to students, Villa Julie also works with outside groups to conduct sports camps. Some sports camps offer a residential component in which attendees are allowed to reside in the residence halls during camp sessions.

8.7 Volunteer and Community Service

All Baltimore Collegetown Network members have formal and informal programs for faculty, staff and students to become involved in and support our local communities through volunteer and community service. Some program examples are presented below.

- Community Service at the College of Notre Dame is led by a recognized Student Association student-run group, the **Community Service Organization** (CSO). CSO meet on a weekly basis to plan and provide opportunities for student involvement and service. Some of the opportunities available are:

    - Serving the needs of those at School Sister of Notre Dame such as St. Ambrose Outreach Center, Caroline Center, and food for thought;
    - Outreach to the elderly through the annual Thanksgiving Dinner;
    - Coats for Kids and toys are collected for holidays and shelters;
    - Sandwich and meal preparation at the Oasis Shelter and Our Daily Bread in Baltimore;
    - Blood drives with the American Red Cross;
    - Canned Food Drive; and
    - Walks for Cancer Research.
- Annually, students, faculty, and staff of Coppin State University participate in service to the community. Last year, the faculty members spent an average of 24 days in service to local volunteer, government and state agencies. This includes schools and non-profit organizations as well. Students also participate in volunteer work that supports the vitality and economic growth of the community through various campus organizations such as honor societies, fraternities and sororities. The Schools of Nursing, Education, Arts and Sciences and Professional Studies have faculty that participate in annual community service initiatives such as literacy programs for parents and students, health and wellness clinics, walk-in service clinics, public symposiums and conferences in criminal justice, visual and performing arts productions and the full operation of a Baltimore City public school.
- With its collaboration with numerous non-profits in the area, students at Goucher College can participate in many community service opportunities including working with:
    - American Red Cross;
    - Brighton Gardens;
    - Days End Farm Horse Rescue;
    - Don Miller House;
    - Dyslexia Tutoring Program;
    - Habitat for Humanity;
    - Hampden Family Center;
    - Humane Society of Baltimore County;
    - International Rescue Committee;
    - Meals on Wheels;
    - Our Daily Bread Soup Kitchen; and
    - Living Classrooms Foundation.
- Johns Hopkins University is extremely active in the community and provides a variety of services to assist the under-privileged. **Cooking for Love** provides meals to battered women's shelters weekly, while **Habitat for Humanity** sponsors the reconstruction of

houses for homeless families. In addition to these programs, Hopkins has developed many community service oriented groups such as Engineers without Borders, JHU Conservation Society, Vision Xchange, and Peace by P.E.A.C.E.

- Johns Hopkins University offers **The Connection** a community consultant program that was created in May 2005 to provide consulting services to community-based organizations in Baltimore that are affiliated with SOURCE, the Student Outreach Resource Center (SOURCE). Source is the community service and service-learning center for the Johns Hopkins University Schools of Medicine, Nursing, and Public Health. SOURCE provides academic, professional and personal development opportunities for the members of the JHU Schools of Medicine, Nursing, and Public Health through community outreach and service-learning partnerships with community-based organizations. The three Schools founded SOURCE in January, 2005 to satisfy the need for a single interdisciplinary community service and volunteerism center that could coordinate volunteer activities and reduce duplication of effort and services. SOURCE has a particular, but not exclusive, focus on East Baltimore neighborhoods near the medical institutions. SOURCE partners with approximately 90 community-based organizations in order to offer involvement opportunities (volunteer positions, internships, federal work-study, capstone projects, and more) to students in the health professional schools.

  - The **Center for Community Service and Justice** at Loyola College has developed numerous programs to inform and heighten the awareness the entire Loyola community on the issues of social justice. The following are a few of Loyola's programs:
    - **Hunger and Homelessness Awareness Activities**- Activities are designed to inform and educate the entire Loyola community about people who are materially poor, hungry and/or homeless, as well as to offer opportunities for involvement with people experiencing these situations;
    - **Fast and Sleep Out**- A 24-hour event where members of the Loyola community fast and sleep out on the quad and listen to speakers in a "Faces of Homelessness" panel, etc. to learn about and be in solidarity with those who are homeless;
    - **Lobby Days**- Health care providers, students, people experiencing homelessness, and advocates for people who are materially poor gather in Annapolis in support of programs and policies that help prevent the un-natural disasters of poverty, hunger, and homelessness from devastating the lives of the most vulnerable Marylanders; and
    - **Care-A-Van**- Volunteers share food and conversation with people in the heart of Baltimore City.
  - The **Community Arts Partnership program (CAP)** at Maryland Institute College of Art involves students in community based projects in neighborhoods that are among the most economically and culturally challenged in Baltimore City. The 40 CAP projects have covered a wide array of visual arts including murals, collage, puppetry, fabric art, costumes, book making, digital art, video, animation, photography, and photojournalism.
  - McDaniel College's **Harnessing Youth's Positive Energy (HYPE)** is community service task forces comprised of service leaders across the campus that coordinates

service events and annual awards to promote the spirit of service at McDaniel College. Volunteer opportunities include hosting a spring carnival for community members to enjoy, collect donations for local needy families, and working with various humanitarian agencies. McDaniel College offers both group and individual volunteer opportunities. Examples of these opportunities include:

  - **Spring Carnival;**
  - **Snowman Project**- student organizations put together a giant Snowman and collect donations for local needy families; and
  - **Oxfam America**- non-profit, humanitarian agency that works to educate the American public about hunger and development issues.

- The Office of Community Service at Morgan State University was created to develop and implement dynamic community service programs that boldly address the educational, social, cultural and recreational needs of the under-represented, the educationally "at-risk" and the homeless residents in the Baltimore area. Selected programs are listed below.
  - **ASANTE**: an opportunity for high school students to earn community service credit by working with faculty and staff throughout the University.
  - **Brother-to-Brother**: a mentoring program in which male volunteers work with male high school students to engage in activities that are designed to teach self-awareness, leadership and responsibility, cooperation, and survival skills.
  - **JAHOD**: a program for adolescent females in which educational, cultural, social and recreational activities are designed to enable female youth to overcome the negative challenges they encounter in their neighborhoods, schools and daily lives.
  - **MSU Tutoring Corps**: an in-school and after-school educational, social and cultural learning opportunity for students in the Baltimore area. The goal is to help reduce the dropout rate of African American youth in public schools.
- Towson University offers numerous programs for faculty, staff and students to engage in community service. Some examples are listed below.
  - The **Women in Leadership** volunteers (through the Women's Center) at the Ronald McDonald House to work with sick children on recreational and other volunteer activities, while said kids are recovering from ailments.
  - **Project Serve** - Incoming freshmen have the opportunity to do community service in the Baltimore area for 2 days before students are able to move into the dorms.
  - **Alternative Spring Break** - Students go to New Orleans to clean and assist in renovating houses that were ruined in Hurricane Katrina.
  - **Community Service Week** - Students participate in a variety of programs during the week including visiting the Ronald McDonald House, making baby blankets for Johns Hopkins Children's Center, MS Walk and many others.

- **Adopt-A-Campus** - Students are organized into zones around campus and must pick up trash on designated days.
- **TigerThon** - Students raise money for the Johns Hopkins Children's Center in a 12 hour dance marathon.

- Participants of the **Leadership Certification Program** at University of Baltimore are required to perform a designated number of hours of community service for each of the two levels of certification offered. Each semester 6 different opportunities to serve the local community or a local charity are offered and all students, faculty and staff are invited to participate. The program has accrued 250.5 hours of service from 43 participants in the 2006 fall semester. Additionally, 60 percent of UB student organizations participate in service activities throughout the school year. The UB Community Outreach Program was created to develop a comprehensive outreach plan that will allow UB staff members to volunteer in the community while on university time.
- The University of Maryland, Baltimore has several programs where their students, faculty, and staff are involved in community service programs. Some examples of these programs are listed below.
  - The School of Medicine plays a critical role in improving and maintaining the physical health of Maryland residents. The medical school faculty provides care regardless of the ability of patients to pay for their healthcare services. Overall, the faculty physicians provide an estimated $12 million in uncompensated care services each year.
  - Staffed by the School of Pharmacy, the **Maryland Poison Center (MPC)** provides 24 hour, 365-day emergency services to all areas of the State. The center fields more than 60,000 poison-related calls pear year and offers a variety of public and professional education programs regarding poison prevention.
  - The members of the School of Nursing practice hands-on education by participating in 10 school-based **Wellness Centers**. Those who assist in these centers address unmet health needs of children and adolescents and provide help to stabilize chronic health conditions throughout various elementary, middle, and high school settings.
  - The School of Nursing participates in the **Governor's Well Mobile Program** which consists of four mobile health units, staffed by family nurse practitioners, who provide primary and preventable services to children, their families, and the homeless across the State of Maryland. The program averages over 6,000 client visits each year.
  - **The Baltimore Community Medical Outreach (BCMO)**, facilitated by the School of Medicine, offers primary health care services to residents of West Baltimore and provides interactive workshops on a range of health topics including HIV/AIDS, Hepatitis, STDs and Detoxification.
  - The School of Medicine also motivates students to volunteer in the **Community Health Awareness and Monitoring Program (CHAMP).** The community

based health education and prevention program teaches people to motivate and assist one another to adopt healthier lifestyles and become self-reliant.

- Students in the pre-doctoral DDS and dental hygiene programs provide oral health care services to community outreach/patient care programs throughout the State of Maryland under School-sponsored, extramural rotations and externships.

- University of Maryland, Baltimore County supports numerous programs in which faculty and staff becomes active members in the local community. The majority of participants in these programs are students. The volunteer opportunities include:
  - **Welcome Week Service Project**: a community service day offered at the beginning of each semester in which 80 UMBC community members volunteer in Baltimore City and County communities;
  - **UMBC Athletics Community Outreach**: an opportunity for UMBC Students Athletes and Coaches to encourage students to develop positive habits and skills, encourage adolescents to succeed and promote higher education, promote academic excellences and emphasize character skills, and leadership and tutoring efforts.
- Various student organizations at Villa Julie College combine together to form an annual Service Corps consisting of 50 students who organize regular service events with numerous community organizations. The Service Corp has established formal service experiences with Our Daily Bread, Johns Hopkins Hospital, Maryland Food Bank, Baltimore Social Services, Baltimore Book Bank, local park and recreation centers, stream clean-up, tree planting, etc. Each club and organization is required to participate in at least one service project per semester. The **Learning Beyond Program** allows students to take what they learned in the classroom into the world and also provide them with new knowledge to take back into the classroom through study abroad experiences, service learning, field placements, independent studies, and other experimental learning opportunities.

A Consideration of the Impacts of the Baltimore Collegetown Network

RESI of Towson University

February 2008

TABLE OF CONTENTS

1.0 Executive Summary

Higher educational institutions play a multitude of roles within local communities and economies. Traditionally, colleges and universities have been viewed according to their primary mandate: as educators for youth and adult populations within a given area. In this capacity, these institutions play a crucial role as workforce development engines for a given region. Certainly, the significance of this role can not be underestimated, especially from an economic development perspective. Colleges and universities have also long been recognized for the many social and cultural functions they serve within their region. This continues to be true today, as higher education institutions offer the opportunity for students and the community to participate in and/or attend a host of events, ranging from community service projects, lecture series and arts performances to a wide array of sporting events.

It is perhaps too simplistic to view these institutions solely according to these functions, however. In recent years, there has been a growing recognition of the role that colleges and universities play as regional economic engines. Often, colleges and universities are major employers for an area (and thus they support significant additional, spin-off job activity and associated wages and tax revenues).

The Baltimore Collegetown Network is no exception to this rule, as evidenced by the following statistics:

- According to JFI's 2007 study, the member institutions of the Baltimore Collegetown Network directly employ a collective total of 47,079 individuals with an additional 20,005 workers at the academic medical centers. On average these are high wage positions with annual wages and salaries approaching $52,000.

- The JFI study finds that these 67,084 direct jobs support an additional 95,834 (indirect and induced) jobs throughout the region. Thus the total jobs impact of BCN's member institutions and hospitals amounts to nearly 163,000 jobs. Average annual wages and salaries amount to more than $40,600.

To further contextualize these figures, RESI reviewed previously published impacts for select, Maryland industries. The literature yields the following jobs impacts:

- Maryland's Port of Baltimore-related industries directly employ fewer than 16,000 workers. Annual average wages and salaries for these direct employees are roughly $56,000. The additional spin-off jobs supported by this industry bring the total jobs impact to less than 33,000.

- Tourism spending in Maryland directly supports/generates nearly 116,000 jobs (including full time, part time and seasonal jobs). Average annual

wages and salaries for these positions amount to roughly $27,000.[1] Once spin-off (multiplicative) impacts are included, the total impact exceeds 197,000 jobs.

The results of this comparison are significant for a number of reasons. First, we find that the scale of BCN's jobs impacts (67,084 direct jobs and 162,918 total jobs) are quite significant, especially considering that results for tourism industries include employment impacts for the entire state of Maryland. Moreover, the data show that BCN-supported jobs are high quality, high wage jobs. This is particularly true of the direct employment impacts. The average annual incomes of $52,000 compare quite well not only to the average for the State (roughly $44,000[2]) and the Baltimore metropolitan region (more than $43,000[3]), but they also far exceed wages associated with other industries such as tourism ($27,000). In addition, the multiplier effect for the BCN jobs is significant. For every direct employee of BCN, 1.43 additional jobs are supported in the regional economy (multiplier equals 2.43). This compares to 1.09 additional jobs supported by each direct Port employee (multiplier equals 2.09) and just 0.7 additional jobs supported by each tourism position in Maryland (multiplier equals 1.7).

Colleges and universities serve as economic engines in other capacities as well and this is evidenced by the way institutions increasingly interact with other business segments. In the case of the Baltimore Collegetown Network, this interaction is occurring on many levels. Two examples highlighted in this analysis include: (1) the creation and operations of university led and/or affiliated science and technology parks as well as (2) a myriad of endeavors aimed at spurring local entrepreneurial activity.

Research colleges and universities are increasingly working with other business sectors to commercialize their work. Three Collegetown member institutions either operate or are affiliated with science and technology parks including: the University of Maryland, Baltimore County's bwtech@UMBC, the University of Maryland, Baltimore's UMB Biopark and the Johns Hopkins Science + Technology Park.

- Bwtech@UMBC was established in 1989 and currently encompasses 41 acres and five research buildings (two of which are currently under construction). The park is focused on supporting both IT and life science endeavors and boasts tenant firms such as RWD Technologies, Invoke Systems and the Goddard Earth Sciences and Technology Center, among others.

- The UMB Biopark, established in 2003, is focused on harnessing and commercializing the University's bioscience research. Among the Park's current and committed future tenants are firms such as Alba Therapeutics and the Institute of Genome Sciences.

[1] RESI adjusted the Maryland Office of Tourism Development's reported average annual salary to account for inflation.
[2] Bureau of Labor Statistics, 2006 data.
[3] Bureau of Labor Statistics, 2006 data.

- The Johns Hopkins Science + Technology Park, still in the planning stages, will provide tenant firms with access to the University's specialized research services and equipment. The Park's first building will be anchored by the University's Medicine Institute for Basic Biomedical Sciences. Two additional tenants have already signed agreements to lease additional space in the Park's first building, including the Howard Hughes Medical Center and Cangen Biotechnologies.

Not only does this type of technology transfer result in the generation of licensing and other income for the institutions, but it also supports local business growth and creation as well. Whether by encouraging the formation of University spin-off firms, or attracting existing firms to the region, the services provided by the parks and the access to university research and relationships is resulting in the generation and support of jobs, wages and salaries, tax revenues and output impacts for the region. Previous studies estimate that bwtech@UMBC (along with the Park's incubator and accelerator facilities) generate/support 841 direct jobs and have a total jobs impact of 2,000 for the State of Maryland. Likewise, the UMB Biopark is projected to generate/support a total of 3,000 jobs for the State's economy.

Another way institutions are creating additional economic impacts is by working directly with the local business community to support entrepreneurship through the provision of not only education, but other types of consulting services as well. Several BCN member institutions operate entities focused on building the region's entrepreneurial activity. Among these are:

- The University of Baltimore (UB) is home to three entrepreneurial programs: the Entrepreneurial Opportunity Center (EOC), the Baltimore Community Wealth Venture Collaborative (BCWC) and the Center for Technology Commercialization (CTC). EOC provides direct assistance and support to UB students interested in starting their own business, while BCWC provides existing local businesses with access to student support, research and other types of technical assistance. The CTC works to advance the commercialization of technology in Maryland by training students and professionals in the arts or entrepreneurship, technology transfer and high-tech commercialization.

- The Entrepreneurial Development and Assistance Center (EDAC) at Morgan State University offers an assortment of wealth building options for small business owners. The center offers business development training courses, such as BusinessCore; an eight week training course that focuses on business plan development. The EDAC's mission is to provide resources and encouragement through networking and professional development activities.[4]

[4]Entrepreneurial Development and Assistance Center, http://www.edacmorgan.com/index.php (accessed on December 11, 2007).

- At Loyola University, the Center for Closely Held Firms is focused on helping closely held and family businesses prosper through access to a wealth of local business resources and networking opportunities. The Center offers members regular seminars on topics ranging from strategic planning, economic and investment outlooks, managing health care costs and employee retention, among others.

- Towson University is home to the Maryland Small Business Development Center (SBDC), which is dedicated to helping establish and expand small businesses. SBDC offers business consulting services at no cost to the business owner. The services offered include: developing and refining business plans, trouble shooting, assistance in securing capital and developing strategies to support growth and profitability.

While it is difficult to quantify the economic impact such efforts generate, it is clear that they are serving an economic purpose. According to the United States Small Business Administration, less than half (42.6 percent) of small businesses survive past the four year mark. It is estimated, however, that 87 percent of companies that receive formal training and encouragement are able to successfully pass the four-year barrier.[5] BCN's member institutions provide this vital training and education, as well a host of other services. In this way, these programs are strengthening regional economies and supporting additional company and job formation.

Because of the ever growing, increasingly complex interactions occurring between colleges and universities and other institutions (both federal and academic) as well as with the private sector, this analysis suggests that any comprehensive view of the role played by BCN's member institutions must consider the breadth and depth of BCN's role as a regional economic engine. Collectively, BCN is a major generator of high wage jobs that support significant additional economic activity throughout the region. Moreover, member institutions are spurring economic and entrepreneurial activity through technology transfer and other endeavors and are enhancing the future economic vitality of regional and State economies in the process.

As for the Baltimore region becoming an industry cluster, specifically relating to biotech innovations, the foundation has been laid. As defined by Michael E. Porter, a professor at Harvard Business School, an industry cluster is a geographic concentration of competing and cooperating companies, suppliers, service providers, and other institutions.[6] Clusters are credited with driving the direction and pace of innovation in a way that further stimulates related company growth and formation. As a result, clusters provide a level of cooperation and competition that increases the productivity in a given region.[7]

[5] University of Baltimore. http://www.ubalt.edu/template.cfm?page=1432.
[6] Institute for Strategy and Competitiveness. http://www.isc.hbs.edu/econ-clusters.htm.
[7] Id.

Today, when one thinks of industry clusters, especially those related to innovation, several prominent national examples come to mind including: North Carolina's Research Triangle Park (RTP), the San Francisco Bay area's Silicon Valley and Boston's Route 128 corridor. Our analysis examines the origins and successes of each of these clusters. We conclude that each of these endeavors achieved their current level of success by capitalizing on their base of university research.

- In Baltimore, steps are being taken by the state, academic universities and institutions, and private interest groups to move in a direction more conducive to the transfer of technology, especially in the realm of life sciences. Science & Technology Parks have been recently constructed and continue to be developed, along with state funding in promising medical advances like stem cell research.

- The region receives substantial funding from the National Institute of Health, primarily at Johns Hopkins University, though as the University of Maryland, Baltimore's Biopark has grown more funding has been awarded to the school.

- Additionally, real estate development is occurring throughout the region to accommodate growing businesses, research activities and residential needs. Billions of dollars are being invested in major projects throughout the area, making this one of the most considerable development periods in the region's history.

If members of Greater Baltimore and the State of Maryland cooperate and support the area's efforts for life sciences improvements, through venture capital investment, infrastructure construction and renovation, government assistance and a general willingness to capitalize on knowledge, then the region is poised to become a hub of biotechnology activity. The region has the ingredients to form a successful cluster, which would give the area a leg up in becoming a "brain magnet". However, there must be a conscious effort to cohesively integrate the disparate spheres of government, the private sector, and, especially, academia to aggressively compete in a modern, knowledge-based economy.

2.0 Introduction

The Baltimore Collegetown Network (BCN) contracted RESI of Towson University to explore the economic impacts of higher education within the Baltimore Metropolitan Area.

To achieve this objective, RESI first contextualizes BCN's annual economic contributions to the local economy (section 3.0). These economic impacts, as estimated by JFI, include the output, employment, employee compensation, and fiscal impacts (tax revenues) supported by the operations of BCN's member institutions. JFI determined that BCN supports/generates significant economic activity in the region. To add some perspective to the numbers generated by JFI, RESI compares BCN's economic impacts to published impacts for select, Maryland industries, including: tourism and the Port of Baltimore. In recent years, each of these high profile industries has underscored its role as an economic engine for the State's economy. RESI's comparison of published impacts reveals that the BCN member institutions also serve as vital economic engines for the region. RESI also compares JFI's findings to the economic impacts that other higher education institutions or groups of institutions have on their surrounding regions. This analysis confirms that BCN's multiplier effect, as estimated by JFI, is in line with the body of literature on this subject.

This analysis also highlights some examples of "nontraditional impacts" that BCN has on the region (Section 4.0). Today's colleges and universities increasingly interact with surrounding business communities in efforts which not only financially benefit higher education institutions, but create additional economic impacts (beyond the employment, wage, output and tax revenue impacts supported by the operations of the institutions). Two examples are considered in this analysis: (1) the operations of science and technology parks affiliated with higher education institutions and (2) college/university affiliated efforts to spur local entrepreneurial activity. Though these effects are sometimes difficult to quantify, they nonetheless represent another means through which BCN is positively impacting the local economy.

Furthermore, RESI looked at three well known clusters (North Carolina's Research Triangle Park, Silicon Valley, and Boston's Route 128) to determine what made these regions successful in their growth. Once it was determined what each region's key ingredients were, RESI concentrated on what the Baltimore Metropolitan Statistical Area (Baltimore MSA) already had in place that would help it grow into a "brain magnet". From there it was clarified what advantages Baltimore MSA currently has and what the region is missing in order to make it a successful cluster.

3.0 Economic Impacts

The Jacob France Institute (JFI) at the University of Baltimore conducted surveys with 15 members of the Baltimore Collegetown Network (BCN) to gauge BCN's direct employment, employee compensation, output, and fiscal impacts on the region. JFI then estimated the total economic contributions associated with BCN using the U.S. Bureau of Economic Analysis's RIMS II input/output model. The RIMS II model analyzes inter-industry input-output data and regional economic composition to estimate the extended effects of specific economic activities.[8] Through direct and multiplicative impacts, JFI finds that BCN member institutions and associated medical centers support 162,918 jobs and $6.6 billion in income earnings, contribute $235.8 million in direct and indirect tax revenues and a total of $17.2 billion in annual output (or Gross Domestic Product) for the Baltimore region.

While the JFI estimates are impressive, it is difficult to appreciate these impacts in a vacuum. To place these results in context, RESI compared the Collegetown Network impacts to previously published impacts for select, Maryland industries. Namely, the RESI team considered the following industries: tourism, Port of Baltimore-related industry. Previously published studies have found that each of these high profile industries serves as an economic engine for the State's economy.

A comparison of results reveals that BCN's annual economic impacts compare quite favorably to these industries, as shown in the following tables.[9]

Table 1: Employment Figures[10]

Sector	**Direct**	**Multiplicative**	**Total**
Tourism	115,800	81,700	197,500
Baltimore Collegetown Network	*67,084*	*95,834*	*162,918*
Port of Baltimore	15,740	17,216	32,956

Table 1 reveals that BCN employs more than 67,000 persons directly and has a total employment impact of close to 163,000. Maryland's Port of Baltimore-related industries directly employ fewer than 16,000 workers. The additional spin-off jobs supported by this industry bring the total jobs impact to less than 33,000. Tourism spending in Maryland directly supports/generates nearly 116,000 jobs (including full time, part time and seasonal jobs). Once spin-off (multiplicative) impacts are included, the total impact exceeds 197,000 jobs.

[8] Bureau of Economic Analysis. http://www.bea.gov/bea/regional/rims/brfdesc.cfm.

[9] It should be noted, that the Baltimore Collegetown figures, excluding tax revenue, refer to the Baltimore metropolitan region only. The economic impacts studies referencing the comparison industries, on the other hand, refer to the entire State and not a specific region.

[10] Jacob France Institute. The Economic Impacts of Port of Baltimore.; The Economic Impact of Travel on Maryland Counties 2005.

Table 2: Labor Income, Adjusted for Inflation: 2006 Dollars[11]

Sector	Direct	Multiplicative	Total
Tourism[12]	$3,143.4	$2,956.2	$6,099.6
Baltimore Collegetown Network	*$3,476.7*	*$3,151.2*	*$6,627.8*
Port of Baltimore[13]	$892.8	$1,292.9	$2,185.7

Note: Dollars in Millions

By dividing the labor income figures in Table 2 by the employment figures in Table 1, one can determine average annual wages and salaries for each industry (see Table 3). The average annual salary for a direct employee of BCN, in 2006 dollars, is approximately $52,000, slightly below the Port of Baltimore, ($56,703). Average annual wages and salaries for tourism amount to just $27,145.

Table 3 : Average Annual Salaries[14]

Sector	Average Annual Salaryfor Direct Employees	Adjusted for Inflation
Tourism	$26,252	$27,145
Baltimore Collegetown Network	*$51,826*	*$51,826*
Port of Baltimore	$50,877	$56,703

Output or Gross Domestic Product is the total dollar amount of all goods and services produced by an entity. BCN's estimated annual output impact on the Baltimore region's economy amounts to $17.2 billion. This impact is revealed to be 10.5 times greater than that of the Port of Baltimore (see Table 4).

Table 4: Output Impacts, Adjusted for Inflation: 2006 Dollars[15]

Sector	Direct	Multiplicative	Total
Tourism[16]	$11,038.9	$5,826.6	$16,865.5
Baltimore Collegetown Network	*$7,973.9*	*$9,252.2*	*$17,226.1*
Port of Baltimore[17]	NA	NA	$1,638.4

Note: Dollars in Millions

JFI estimates that, in 2006, BCN generated over $235 million in tax revenues. It should be noted that the balance of the studies reviewed by the RESI team estimate state and

[11] Id.
[12] Numbers from study for direct labor income before inflation adjustment was $3.04 billion, multiplicative labor income was $2.58 billion, for a total of $5.9 billion.
[13] Numbers from study for direct labor income before inflation adjustment was $800 million, multiplicative labor income was $1.16 billion, for a total of $1.96 billion.
[14] Id.
[15] The Economic Impacts of Port of Baltimore.; The Economic Impact of Travel on Maryland Counties 2005.; Jacob France Institute.
[16] Numbers from study for direct output impacts before inflation adjustment was $10.66 billion, multiplicative output impact was $5.64 billion, for a total of $16.31 billion.
[17] Numbers from study for total output impacts before inflation adjustment was $1.47 billion.

local tax revenue generation, while the JFI study includes only state income and retail tax revenues.

Table 5: Tax Revenue, Adjusted for Inflation: 2006 Dollars[18]

Sector	**Total**
Tourism	$878.7
Port of Baltimore	$240.7
Baltimore Collegetown Network	*$235.8*

Note: Dollars in Millions

The results of this comparison are significant for a number of reasons. First, BCN has quite a significant impact on regional employment, especially considering that the study on the tourism industry includes employment impacts for the entire state of Maryland and not just a defined region, like Greater Baltimore. Moreover, we find the jobs that the BCN supports are high quality, high wage jobs. This is especially true of the direct employment impacts. With average annual salaries of approximately $52,000, these wages compare quite well not only to the average for the State (roughly $44,000[19]) and the Baltimore metropolitan region (more than $43,000[20]), but also far exceed wages associated with other industries such as tourism ($27,000). In addition, the multiplier effect for the BCN jobs is significant. For every direct employee of BCN, 1.43 additional jobs are supported in the regional economy (multiplier equals 2.43). This compares to 1.09 additional jobs supported by each direct Port employee (multiplier equals 2.09) and just 0.7 additional jobs supported by each tourism position in the State (multiplier equals 1.7).

[18] Id.
[19] Bureau of Labor Statistics, 2006 data.
[20] Id.

4.0 Nontraditional Impacts[21] – Local Best Practices

Colleges and universities serve as economic engines not only in terms of the economic impacts they generate, but in other capacities as well evidenced by the way institutions increasingly interact with other business segments. The full impacts of such interactions are often difficult to quantify and are referred to in this analysis as "nontraditional" impacts. In the case of BCN, this interaction is occurring on many levels. Two examples highlighted in this analysis include: (1) the creation and operations of university led and/or affiliated science and technology parks as well as (2) a myriad of endeavors aimed at spurring local entrepreneurial activity.

4.1 Science & Technology Parks

One way that area higher educational institutions are acting as economic engines is through the creation and operations of science and technology parks. These entities, often owned and operated or affiliated with a college or university, provide essential services and facilities to emerging young companies. Moreover, these parks are encouraging increased business formation and technology transfer in the areas of science and technology and in doing so, are working to fulfill the State's mission with respect to technology transfer.

Maryland has long been at the forefront of science and technology research, as evidenced by the State's impressive pool of scientists and engineers as well as by the amount of research funding and activity taking place throughout the State's many academic and federal research centers and laboratories. In fact, Maryland boasts the highest per capita number of bioscience research/scientists in the nation (over 45,000) and the second highest concentration of doctoral scientists and engineers.[22] Moreover, in 2004, the state received over $1.4 billion in NIH funding, placing Maryland among the top five states receiving NIH funds. According to a study completed by the Milken Institute using 2004 AUTM[23] data, universities in the State ranked high (top 10 out of 185) on research expenditures, invention disclosures and patents filed, but appear to lag behind other areas in terms of technology commercialization metrics such as licensing income generated or

21 Initially RESI planned to include a section in which we compared the economic impact that JFI found BCN to have on the Baltimore Metropolitan Statistical Area to results found in other higher education impact studies. However, because the impact studies varied in their scope and methodology, forming a coherent and meaningful comparison proved impossible. For instance, most studies we surveyed investigated the effect of only one university on its surrounding area, which greatly decreases our ability to relate their findings with JFI's study, which included fifteen institutions. Even studies that did examine multiple schools had vastly different population sizes, for students, faculty/staff, and the region, than BCN and rarely included all the region's schools. The BCN study is rare in that it successfully incorporates both private and public institutions to gather data on all the lion's share of the region's higher education options. Studies that fail to include all or very nearly all of an area's higher education choices lack the substitution control found in JFI's report. For methodology, the majority of the papers used IMPLAN rather than RIMS II, which JFI employed; this reduces the comparability of the multiplicative estimates across the studies. Although we had hoped to include a robust analysis of JFI's report, such a task fell outside the scope of our contribution.

22 Forest City Science + Technology Group.
http://www.forestcityscience.net/hopkins/region_statistics.shtml

23 Association of University Technology Managers

the number of university spin off companies formed. The Milken study reinforces the notion that Maryland's technology transfer and commercialization is not occurring at the rate that one would expect given the State's tremendous base of research.

The State has long recognized technology transfer as a priority and has worked to enhance the transfer of university and federal research from the lab to the private sector. In 1998, the Maryland General Assembly established the Maryland Technology Development Corporation (TEDCO) to facilitate technology transfer and to foster related, small business growth. As another vehicle for funding technology transfer, the State established The Maryland Venture Fund (an entity under DBED) in 1994. The Maryland Venture Fund makes direct investments in life sciences and technology companies and indirect investments in venture capital funds. To achieve its mission, the fund used two investment mediums: the Challenge Investment Program (CIP) and the Enterprise Investment Fund (EIF). CIP makes seed investments into purely high tech start up firms, while EIF provides equity investments for early-stage, high technology firms. Through these and other investments, the State has committed to build on its base of science and technology. A recent press release indicates that the State has invested more than $450 million in resources towards life sciences, alone.[24]

The three BCN operated or affiliated research and technology parks are also playing a part in encouraging technology transfer and company formation and growth, as described in the following section.

4.1.1 University of Maryland, Baltimore County: bwtech@UMBC

Bwtech@UMBC was established in 1989 with the mission of providing companies with access to university expertise, students, technology, programs and facilities. The park is focused on supporting both IT and life science endeavors and boasts tenant firms such as RWD Technologies, Invoke Systems and the Goddard Earth Sciences and Technology Center, among others. The Park began with just 8,000 square feet of space (in a single trailer) and has since expanded to encompass five research buildings (two of which are currently under construction, but will be available in the second half of 2008) on 41 acres.

RWD Technologies is a Baltimore based firm that serves Fortune 500 and major multinational corporations around the world. The company has annual revenues of over $160 million and more than 1,000 employees at offices in the U.S., U.K, France, Germany, Australia and Canada. RWD develops, implements, and supports services in the areas of performance solutions, enterprise learning and applied technologies. The Goddard Earth Sciences and Technology Center was created when NASA's Goddard Space Flight Center awarded a Cooperative Agreement to the University of Maryland, Baltimore County to create a center of excellence in earth sciences in 2000.

According to a 2005 study, estimating the economic impacts of both bwtech@UMBC (the bioscience and technology park) and techcenter@UMBC (the incubator and accelerator facilities), these entities are estimated to have generated $100 million in

[24] Office of Governor - Press Release, April 3, 2007.

income and more than $200 million in business sales. This revenue is attributed with the generation of $11 million in state income and sales tax revenue, plus $7 million in Baltimore-area local income tax collections. The facilities are also responsible for the creation of 841 direct jobs and more than 2,000 total jobs statewide.

4.1.2 University of Maryland, Baltimore: UMB Biopark

The UMB Biopark, established in 2003, is focused on harnessing and commercializing the University's bioscience research while at the same time enhancing local economic development. Since 2003, the Biopark has completed construction on two buildings, adding 358,000 square feet of research space, created 200 jobs, and generated $128 million in investment capital.[25]

Currently UMB Biopark's first building is home to six commercial companies and several University of Maryland programs. In addition, several firms have recently committed to locate to the Parks second building. Among these firms are Alba Therapeutics, a UMB spin-off and current tenant of building one, as well as the Institute of Genome Sciences (initially located in Rockville).

Over the course of the ten year build-out period, the Biopark is projected to create 3,000 jobs with an estimated salary of $45,000 annually per job. During construction an estimated $714,000 in municipal fees will be generated, and by year ten, the project is expected to generate $1.4 million in city tax revenues. Moreover, because the Biopark is located within both a federally designated Empowerment Zone and a state designated Enterprise Zone, tenants who occupy space in the buildings, may qualify for various tax credits and low interest loans. These incentives along with close proximity to the University of Maryland, Baltimore, will help spur growth in this area and drive economic development forward. In recognition of the UMB Biopark's success, the Association of University Research Parks named it the Emerging University Research Science Park of the Year for 2007.

4.1.3 Johns Hopkins Science + Technology Park

The newest of Baltimore bioscience and technology parks, the Science + Technology Park at Johns Hopkins (the JHU Park), is envisioned as a mix-ed use development (including residential and retail components in addition to five planned research buildings. The Park's first building, opening May 2008, will offer over 277,000 square feet, 17,000 of which is expected to be appropriated for retail use. Once completed, the five buildings will provide 1.1 million square feet of lab and office space, and is estimated to generate/support as many as 8,000 jobs. This first building will be anchored by Johns Hopkins Medicine's Institute for Basic Biomedical Sciences (occupying 100,000 sq. ft.). The Howard Hughes Medical Institute has recently signed on to occupy 4,550 square feet. Although Johns Hopkins is not a direct owner in this project, it has pledged that tenants will have full, cost-effective access to specialized medical research services and equipment.

[25] Id.

Just this past October, Cangen Biotechnologies (Cangen) signed a lease for approximately 12,300 square feet of the park's first building. Cangen is a cancer focused biotech company developing non-invasive diagnostic tests for the early detection of cancer. Cangen is headquartered in Bethesda, with labs in Rockville, additional research conducted at Johns Hopkins University and a clinical trial center in Seoul, Korea. The Company expects to bring its first product (a diagnostic test for the early detection of bladder cancer) to market in early 2008.

4.2 Entrepreneurship

The significant impact of small business on national and regional economies has been well document. Estimates indicate that small businesses are responsible for two thirds of new jobs created in the U.S. economy and that these businesses employ roughly half of the nation's employees. By working directly with the local business community to support entrepreneurship through the provision of not only education, but other types of consulting services as well, several BCN member institutions are working to build the region's base of small businesses. These efforts are described in the following section.

4.2.1 University of Baltimore

The University of Baltimore (UB) is home to three entrepreneurial programs: the Entrepreneurial Opportunity Center (EOC), the Baltimore Community Wealth Venture Collaborative (BCWC) and the Center for Technology Commercialization (CTC). EOC provides direct assistance and support to UB students interested in starting their own business, while BCWC provides existing local businesses with access to student support, research and other types of technical assistance. The CTC works to advance the commercialization of technology in Maryland by training students and professionals in the arts or entrepreneurship, technology transfer and high-tech commercialization.

4.2.2 Morgan State University

The Entrepreneurial Development and Assistance Center (EDAC) at Morgan State University offers an assortment of wealth building options for small business owners. The center offers business development training courses, such as BusinessCore; an eight week training course that focuses on business plan development. The EDAC's mission is to provide resources and encouragement through networking and professional development activities.[26]

Morgan State University, as the lead institution of the Maryland Technology Partnership of Innovation, a federally funded program that assists businesses in distressed areas, has used its allocated funds to help sponsor its EDAC program. As a part of the program's Financial Fitness workshops, small businesses have the prospect to gain access to capital from $5,000 to $50,000 to be used to start or expand their business.[27] Through its

[26]Entrepreneurial Development and Assistance Center, http://www.edacmorgan.com/index.php (accessed on December 11, 2007).
[27] TEDCO's Annual Report, 2005.

workshops and training course, EDAC has provided learning opportunities to more than 100 local small businesses.[28]

4.2.3 Loyola University

At Loyola University, the Center for Closely Held Firms is focused on helping closely held and family businesses prosper through access to a wealth of local business resources and networking opportunities. The Center offers members regular seminars on topics ranging from strategic planning, economic and investment outlooks, managing health care costs and employee retention, among others.

4.2.4 Towson University

Towson University is home to the Maryland Small Business Development Center (SBDC), which is dedicated to helping establish and expand small businesses. SBDC offers business consulting services at no cost to the business owner. The services offered include: developing and refining business plans, trouble shooting, assistance in securing capital and developing strategies to support growth and profitability. In 2006, it is estimated that SBDC has helped start 37 businesses, created and retained 255 jobs and distributed $13.2 million in loans and equity to area small businesses.

[28] Morgan State University, http://www.morgan.edu/admin/TitleIII/title3.asp (accessed on December 12, 2007).

5.0 Cluster Analysis – Case Studies & Implications

While each park has its own distinct focus and mission, the regional presence of the three parks also holds the promise of cementing the region as a bioscience and technology cluster. An industry cluster, as defined by Michael E. Porter, a professor at Harvard Business School, is a geographic concentration of competing and cooperating companies, suppliers, service providers, and other institutions.[29] Clusters are credited with driving the direction and pace of innovation in a way that further stimulates related company growth and formation. As a result, clusters provide a level of cooperation and competition that increases the productivity in a given region.[30]

Today, when one thinks of industry clusters, especially those related to innovation, several prominent national examples come to mind including: North Carolina's Research Triangle Park (RTP), the San Francisco Bay area's Silicon Valley and Boston's Route 128 corridor. The origins of each of these clusters are examined in this analysis, but one conclusion stands out: each of these endeavors achieved their current level of success by capitalizing on its base of university research. Maryland's investment to capitalize on the Baltimore region's research strengths has the potential to similarly shape the future direction of the local economy.

In each of these cases, the areas under consideration have been able to effectively link academic, private and public spheres to capitalize on existing research strengths. As a result, each area has generated relationships and businesses that have benefited not only their respective region economically, but have also produced cutting edge research which has benefited the health and welfare of people all over the world. Not coincidentally these regions are world-leaders in research funding and capital investment.

Background information on several of the most successful research regions in the country may help in understanding the potential that this clustering effect of bioscience and technology parks, incubators and research universities could have on the Baltimore region. This section of the analysis considers the three aforementioned case studies; RTP, Silicon Valley and Boston's Route 128 corridor.

5.1 Research Triangle Park

Located on 7,000 acres in Raleigh-Durham, North Carolina, Research Triangle Park (RTP) has developed over the past 40 years into a research and development powerhouse. Though known primarily for its biotechnology cluster, RTP has recently expanded into the financial industry. We can point to a few key factors that have brought about the Park's success:

- Cooperation among government, academia, and industry;
- Strong intellectual base;

[29] Institute for Strategy and Competitiveness, http://www.isc.hbs.edu/econ-clusters.htm (accessed on December 11, 2007).
[30] Id.

- State and local funding;
- Entrepreneurial support and development;
- Timing.

RTP was officially founded in 1956 by members of government, academia, and business to provide a setting where members from the three spheres could collaborate and foster North Carolinians' economic prosperity.[31] At the time, North Carolina's manufacturing industry lay stagnant, falling behind the rest of the country and the Southeast. RTP was devised as a way to resuscitate the state's economy and reduce its pervasive "brain drain" by encouraging the growth of innovative and high-skill industries. Such industries would provide North Carolina with high-wage, cutting edge jobs and offer incentives for college graduates to remain in the state. Planners based the Triangle around three research universities, the University of North Carolina (UNC) at Chapel Hill, Duke University, and North Carolina State University (NC State), with the aim to provide research companies access to a strong intellectual base. The State of North Carolina helped to coordinate private sector and university interaction.[32] However, other than funding UNC and NC State, no state taxes went towards the project at that time; it was funded first by textile industry funds and then by $2 million in anonymous, private donations.[33]

The founders of RTP wished to ensure the long-term viability of the Park as a location for academic, public, and private cooperation. They recognized that without the continuous support of faculty for the Park's aspirations the corporate community would lack an incentive to join. Towards this end they established the Research Triangle Institute (RTI). The founders envisioned RTI as an organization that would maintain faculty interest in the Park's concept and assure private sector companies that RTP was a legitimate venture.[34] In 1974, after the Park became solvent, the Triangle Universities Center for Advanced Studies, Inc. (TUCASI) was founded. TUCASI's mission remains to preserve the presence in the Park of UNC, Duke, and NC State by assisting and facilitating research in RTP's academic sector.[35] On top of faculty involvement, the universities provide an elite intellectual base from which businesses can recruit new hires. Students represent an easy and efficient technology and knowledge transfer as they move from their undergraduate and graduate settings to the private sector.

When IBM and the U.S. Department of Health, Education, and Welfare both set up large facilities in RTP roughly five years after the establishment of RTI, the Park's legitimacy as a research and development sanctuary was confirmed. In the 40 years since, RTP has annually averaged the addition of six companies and approximately 1,800 employees.[36]

The average has been considerably elevated by significant growth in the 1980s and 1990s. Not coincidentally, in the early 1980s the State of North Carolina founded and

[31] Research Triangle Foundation of North Carolina, 2-3.
[32] Id.
[33] Maness, Reid: "Research Triangle Park Today".
[34] Research Triangle Foundation of North Carolina, 4.
[35] Id, 5.
[36] Id.

funded the North Carolina Biotechnology Center (NCBC), the world's first government-sponsored organization devoted to the development of the biotechnology industry. In the roughly 25 years since its inception, the NCBC has invested over $187 billion in support and promotion of biotechnology throughout the state primarily in the forms of loans and grants.[37] A separate estimate puts state and local expenditures on RTP infrastructure at $35 million.[38]

Research areas like RTP not only provide established firms a place to thrive, but also a dynamic environment in which new businesses can emerge. From its inception RTP has actively encouraged a climate that could foster spin-off company formation. The Park initially lured established firms in the hopes that they would create an atmosphere conducive to smaller start-up industries.[39] Currently at RTP, four incubators host greater than 50 entrepreneurial firms, and in 2006 34 percent of the Park's tenants were start-up companies.[40] The region also houses the Council for Entrepreneurial Development, the largest entrepreneurial support organization in the country, which assists in the development of high-growth, high-impact companies and the promotion of an entrepreneurial culture in the Park.[41] Many of the NCBC's outlays assist small companies in leveraging greater private investment or bridging funding gaps.[42]

RTP has recently attempted to diversify the sectors found in the Park by allowing huge financial and insurance firms to establish new branches[43]. This diversification should provide some insulation from economic downturns in a technology industry that has a larger presence in the region.

A huge contributor to the local economy, RTP contains over 39,000 employees spread over 157 organizations as of 2007. These employees enjoy average annual salaries of about $56,000, nearly double the regional average.[44] RTP has achieved its notable success through a combination of university strength, government support, and entrepreneurial spirit. It was also fortunate to have formed when technology industries, particularly bioscience, were nascent and large research and development settings were exceedingly rare. Perhaps most important, though, is the cooperation that exists among academia, government, and the corporate world. Without it, there would be no commercialization and no reason for businesses to locate in the Park.

5.2 Silicon Valley

Silicon Valley is a marvel of technological innovation and entrepreneurial spirit. Its success, while undeniably astounding, is not one that can easily be transferred to another region. However, the prosperity seen in Silicon Valley can be attributed to several key ingredients:

---

[37] North Carolina Biotechnology Center, http://www.ncbiotech.org/about_us/index.html.
[38] Elstrom, Peter et al: "It Must Be Something in the Water," *BusinessWeek*, August 25, 1997.
[39] Research Triangle Foundation of North Carolina, 5.
[40] Research Triangle Park Overview, www.rtp.org.
[41] Council for Entrepreneurial Development, http://www.cednc.org/about/.
[42] North Carolina Biotechnology Center FAQ, http://www.ncbiotech.org/about_us/faq/index.html#xxx12.
[43] Research Triangle Park Overview, www.rtp.org (accessed on December 6, 2007).
[44] Research Triangle Foundation of North Carolina, 1-2.

- Sound research universities, providing a stream of talent;
- Early federal government funding for post World War II arms race;
- Risk taking investors, not afraid of failure;
- Vast amounts of venture capital;
- Camaraderie among engineers, researchers and scientists, allowing knowledge to flow from one firm to another; and
- Entrepreneurial mindsets that every great idea could be prove to be profitable.

Silicon Valley's research and development sector was born following World War II when the federal government invested significantly in science and technology to compete with the Soviet Union in the Space Race and the Cold War's arms buildup. The Bay Area received a disproportionate level of this research funding, in large part because of the region's presence of four strong research universities: Stanford University, the University of California Berkeley (UC Berkeley), the University of California San Francisco (UC San Francisco), and the University of California Davis (UC Davis).[45] The majority of the Bay Area's other research institutions grew out of these universities, and in many cases have retained significant links to the campuses.

The mere presence of these research universities in the region has been enough to attract many companies. Correspondingly, Stanford, Berkeley, and the other Bay Area schools provide an elite intellectual base for businesses to choose from. In addition to an atmosphere which promotes cooperation and entrepreneurialism, the concerted efforts of the cluster served to dismantle conventional barriers and to increase the flow of research and commercialization ideas to the private sector.[46]

Success in R&D endeavors depends heavily on the amount of capital available to companies and in these cases, clusters. Silicon Valley receives the largest sum of venture capital (VC) on Earth and represents 35 percent of all VC invested in the U.S.[47] Between 1992 and 2001, the region received $307.4 billion (in 1996 dollars) in VC investment.[48] Silicon Valley far and away leads in entrepreneurship, thanks in large part to firms' abnormally swift access to risk capital.[49] Of the 25,787 high-tech firms operating in the region in 2001, 18,217 were established after 1989 and 13,128 were established after 1994.[50] As of 2001, 25,787 high-tech establishments functioned in Silicon Valley, employing 672,825 persons.

While technology firms have driven much of the growth in Silicon Valley, within that heading a broad cross section of industry niches can be found, including semiconductors, computers/communications, software, innovation services, and professional services.[51] Although much of the Valley's success has been within the high tech market, as the

[45] Bay Area Science and Innovation Consortium, 3.
[46] Bay Area Science and Innovation Consortium, 4.
[47] Bay Area Science and Innovation Consortium, "The Bay Area's Research Institutions", 4.
[48] Zhang, Junfu, "High-Tech Start-Ups and Industry Dynamics in Silicon Valley", 92.
[49] Zhang, 73.
[50] Zhang, 96.
[51] Zhang, 97.

economy shifts away from certain technologies or towards others, the area also adapts. This evolution of where R&D is concentrated or spread amongst has helped in keeping Silicon Valley a viable place to do business and invest.

Like RTP and Boston's Route 128, Silicon Valley is also at the forefront of biotechnology development. Biomedical firms in the region specialize in R&D in both medical devices and life sciences and also biopharmaceuticals. In 2004, Silicon Valley employed approximately 33,650 people within its biomedical cluster and was home to some 600 biotech firms. These biotech and medical device firms have seen an increase in venture capital dollars over the years, increasing from 9% in 2001 to 18% in 2004. As convergence between the disciplines of biotechnology, information technology and nanotechnology occurs, the adaptation of Silicon Valley for the new and unknown will be highly beneficial.

The cluster expansion in the Bay Area was, and continues to be, driven by a concerted effort involving the cooperation of government, universities, and the private sector. Many of the people who began or were employed at these emerging firms considered themselves "technological trailblazers" and thus acted accordingly as pioneers. They were particularly receptive to uncertain endeavors that had the possibility for immense return. Along with their risk taking came a shared camaraderie for their overall work as opposed to traditional firm loyalty. It was this mentality of shared wisdom and daringness that really influenced the unprecedented success seen in this region.

5.3 Boston's Route 128

Boston's Route 128 corridor stretches along 65 miles of highway and creates an arc surrounding the Boston metropolitan area. Its technological growth has been second only to Silicon Valley and the two share parallel beginnings. The success seen in Boston is based on a number of factors:

- Large investments from the federal government for information technology research enacted after World War II;
- Superb research universities/institutions, providing pool of talent;
- Solid relationships between academic and business sectors;
- Significant amounts of federal and private funding; and
- Infrastructure development geared at fostering new companies.

Similar to Silicon Valley's beginnings, Boston's Route 128 early days were marked with investment from the federal government as a result of R&D initiatives in information technology in a post World War II United States. Today the region continues to benefit greatly from federal funding at institutions such as the Massachusetts Institute of Technology (MIT), Harvard University, Tufts University, Brandeis University, Boston University (BU), Boston College (BC), Northeastern University, and the University of Massachusetts (UMASS) Boston.

Unlike their California counterpart, however, Route 128 development was more constrained due to a lack of role models and social contacts. The Boston area followed a more conventional separateness, allowing the defense industry, hiring practices and the

region's geography to reinforce this traditionalism.[52] While firms in the area are less socially networked and cooperative, they still maintain strong relationships with academic sectors. These relationships have encouraged brilliant talent, from its universities, to settle in the area**.** Representatives of Merck & Co., AstraZeneca, and Novartis have explicitly stated that the intellectual talent pool in place because of area education institutions drove their decision to locate in the region[53].

In 2000, Boston area's eight major universities, hospitals and research centers received in excess of $2.5 billion in federal and private funding with most of the money being spent in the region. Research institutions with ties to the universities, either formally affiliated or located in the area because of past connections, received $383 million in additional federal funding. Over 80 percent of these universities' combined research spending, in 2000, came from the federal government. Hospitals associated with the universities' medical schools received about $675 million in federal funds (63% of all such funding for voluntary hospitals in the country).[54] In this way, academic research acts as a huge exporter, especially because less than one-half of one percent of research spending is financed by the state and local government.

5.4 The Baltimore Metropolitan Statistical Area[55]

To gauge the Baltimore Metropolitan Statistical Area's (Baltimore MSA) potential to become a "brain magnet" in the vein of Research Triangle Park (RTP), Silicon Valley and Boston Route 128 we must examine Baltimore MSA next to our previous case studies. In this section we explore Baltimore MSA's current strengths and weaknesses when compared to those regions, note conditions Baltimore MSA is missing that those areas have taken advantage of, specify advantages that Baltimore MSA has on them, and consider if the region and state are taking the steps necessary to become a "brain magnet".

Recall that the case study regions have capitalized on strong intellectual capital bases; the conglomeration of government, academic, and industry components; entrepreneurialism, innate and/or supported through state efforts; strong venture capital investment; and some element of timing. We first discuss where Baltimore MSA is now, outlining its strengths and weaknesses.

5.4.1 Where is the Baltimore MSA Today?

Among the Baltimore MSA's strengths are its multitude of academic institutions; its strong intellectual capital base; the presence of academic and federal research institutions; its access to public infrastructure that aims to spur technology

[52] Mackun, Paul, "Silicon Valley and Route 128: Two Faces of the American Technopolis".
[53] Appleseed, 48.
[54] Appleseed, 41.
[55] Baltimore Metropolitan Statistical Area refers to Baltimore City, Baltimore County, Anne Arundel County, Carroll County, Howard County, Harford County, and Queen Annes County. This metro area was defined based on standards set by the federal government, which are adjusted as needed during each decennial census.

commercialization; and its proximity to Washington, D.C. and a wealth of federal laboratories and agencies, as well as access to federal funding. In addition, Baltimore MSA has a diversified economy, which has created a positive business climate, encouraging businesses to locate or expand in the region. Elements of the region's quality of life also represent a strength of the Baltimore MSA.

To realize the extent of intellectual capital available in the Baltimore MSA first consider the 15 BCN member institutions: Baltimore City Community College; College of Notre Dame of Maryland; Community College of Baltimore County; Coppin State University; Goucher College; Johns Hopkins University (JHU); Loyola College of Maryland; Maryland Institute of College Art; McDaniel College; Morgan State University; Towson University; University of Maryland, Baltimore County (UMBC); University of Maryland, Baltimore (UMB); and Villa Julie College. JHU, UMBC, and UMB represent the research base for the area, while the other colleges and universities graduate thousands of bright, driven students. In addition to the research performed at these three universities, two are also home to major teaching hospitals. UMB houses the University of Maryland Medical Center, while JHU is home to Johns Hopkins Hospital. In 2007, Johns Hopkins Hospital was ranked by *U.S. News and World Report* as the best hospital in America (for the 17th year in a row).[56]

The region's wealth of higher educational institutions has fostered the development of a highly educated workforce. In 2005, the Baltimore MSA ranked 10th (when compared to the nations 25 largest metropolitan areas) in percentage of population 25 years of age or older with a bachelors degree or higher. In fact, the Baltimore MSA was well above the U.S. Average (27.2 percent) with 33.0 percent of its population falling into this category.[57] By taking a closer look at which concentrations confer the most degrees we can get a better sense of the area's strengths in intellectual capital. In 2003, the Atlanta Regional Consortium for Higher Education published a report on Higher Education in America's Metropolitan Areas. The study looked at 60 metro areas and ranked each by several factors, one of which was degrees conferred by concentration.

According to the Atlanta Regional Consortium for Higher Education figures, which were based on 2000-2001 numbers, Baltimore ranked 18th for total degrees conferred. In 2001, Baltimore awarded 1,255 degrees in Computer and Information Science, ranking 6th (see Table 6). This ranking is important to mention, because the Baltimore MSA has a high concentration of computer and mathematical science occupations, as is noted later in this section. Furthermore, the State retains a majority of its graduates from its public institutions, as found by the Maryland Higher Education in a Follow-Up Survey of 2004 Bachelor's Degree Recipients. According to the survey, 65 percent of respondents were currently employed in Maryland. Additionally, the survey found that nearly 26 percent

[56] U.S. News and World Report, "America's Best Hospitals", 2007.
[57] Economic Alliance of Greater Baltimore, "Economic Development Progress Report for Greater Baltimore 2000-2007", November 2007.

of graduates, who were not Maryland residents when they first enrolled in a Maryland higher education institution, presently work in the State.[58]

Table 6: Computer & Information Science Degrees Conferred

Rank	Metro Area	Degrees Conferred
1	New York MSA	3,816
2	Chicago MSA	2,372
3	Washington, DC MSA	2,347
4	Los Angeles MSA	1,817
5	Atlanta MSA	1,495
6	***Baltimore MSA***	***1,255***
7	Boston MSA	1,231
8	Philadelphia MSA	1,149
9	Dallas MSA	1,017
10	Pittsburgh MSA	973

Source: Atlanta Regional Council for Higher Education, 2003

Furthermore, about 14 percent of individuals living in the Baltimore MSA hold an advanced or professional degree.[59] This proportion places the region 5th among the 25 most populated metropolitan areas in the country, as can be seen in Table 7. This high concentration of individuals with advanced education, coupled with the highest national concentration located just south in the Washington, D.C. area, should make the Baltimore MSA appealing to other well-educated individuals and firms seeking well-educated employees.

Table 7: Percent of Population Holding an Advanced Degree

Metropolitan Statistical Area	Percent with Advanced Degree
Washington-Arlington-Alexandria, DC-VA-MD-WV	21.3
San Francisco-Oakland-Fremont,CA	17.8
Boston-Cambridge-Quincy, MA-NH	16.6
New York-Northern New Jersey-Long Island, NY-NJ-PA	14.2
Baltimore-Towson, MD	***13.8***
Denver-Aurora, CO	12.8
San Diego-Carlsbad-San Marcos, CA	12.8
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	12.4
Seattle-Tacoma-Bellevue, WA	12.3
Chicago-Naperville-Joliet, IL-IN-WI	12.2
US Average	10.0

[58] Maryland Higher Education Commission, "2004 Bachelor's Degree Recipients at Maryland Public Institutions – Follow-Up Survey Report", March 2006.

[59] An advanced and professional degree is obtained through postgraduate work (e.g. a Master's, PhD, JD, MD or LLM).

Source: U.S. Census American Community Survey, 2005.

University and institutional assets continue to drive research and discovery in the Greater Baltimore region. The National Institute of Health (NIH) provides JHU and UMB with significant amounts of money geared towards research in the life sciences. In 2003, Baltimore ranked 8th in awards received from NIH (see Table 8). When combined with Washington, D.C. Metro Area, however, the total statistical area's ranking jumps to 3rd (again in Table 8). The institution that received the largest sum of awards in the region, and the nation, was JHU with $555,875,515.[60]

Table 8: NIH Awards by Metropolitan Area, 2003

Rank	Metro Area	All Awards
1	Boston CSA[61]	$2,135,737,268
2	New York CSA	$1,769,872,450
3	***Wash-Baltimore CSA***	***$1,447,201,947***
4	San Diego CSA	$1,133,313,946
5	San Francisco - San Jose CSA	$1,009,133,197
6	Los Angeles CSA	$836,845,799
7	Philadelphia CSA	$804,299,094
8	***Baltimore MSA***	***$764,195,420***
9	Raleigh-Durham CSA	$752,430,525
10	Seattle CSA	$730,177,444

Source: Economic Alliance of Greater Baltimore, 2007.

In addition to taking advantage of federal funding awarded to the state for life sciences and other federal research, the State has recognized that the ability of a region to benefit from its intellectual capital, particularly through commercialization, is essential to its success. One entity that helps promote this is Maryland's Technology Development Corporation (TEDCO), which works to foster the creation and growth of Maryland technology related businesses through several funding mechanisms (see Section 4).

Besides TEDCO, the Maryland Department of Business and Economic Development (DBED) has created the Maryland Venture Fund, a publicly funded seed and early-stage equity fund, which targets technology and bioscience companies. Approximately 60 percent of the Fund is invested in technology companies, while the remaining 40 percent is invested in companies falling under the life sciences umbrella. As part of the State's efforts to cultivate small companies, 21 incubators are currently in operation. There are eight business incubators, two of which have received multiple national awards, within the Baltimore MSA. These incubators provide over 240,000 square feet of office/lab space for budding firms. Five of the incubators are either strictly biotech or biotech/information technology focused. These incubators exist because of the paramount position venture capital holds in starting biotechnology companies and producing a final deliverable product. TEDCO and DBED are largely responsible for the

[60] National Institute of Health, NIH Awards to All Institutions by Rank, 2003.
[61] CSA refers to Combined Statistical Area, where two or more neighboring metro areas have 'grown' together to the point they increasingly represent one unified economic entity.

Washington-Baltimore region's tremendous availability of funds for early stage companies.[62] Table 9 demonstrates the success of incubators in Maryland, and expressly the Baltimore region, through incubators national recognition. Both Neotech, located in Howard County, and ETC, in Baltimore City, have received multiple awards for various initiatives and as recognition of their fostering abilities.

Table 9: National Business Incubation Association Awards

Year	Incubator	Program/Company
National Incubator Innovation Award		
2007	Neotech (Howard County)	Federal Small Business Initiative
2004	Neotech (Howard County)	Sustainable Business Excellence
2003	Neotech (Howard County)	Angels and Eggs
National Outstanding Incubator Client		
2007	ETC (Baltimore City)	Social Solutions
2006	ETC (Baltimore City)	Cynergy Group of Baltimore, Inc.

Source: Economic Alliance of Greater Baltimore, 2007.

In addition to having State and private initiatives aimed at promoting technology growth in the Baltimore MSA, the region also takes advantage of its close proximity to Washington, D.C., and thus benefiting from a large presence of federal agencies. The Baltimore MSA houses seven large and highly critical federal agencies, making it home to more than a third of the State's largest federal agencies (19). The National Security Agency is estimated to be the largest employer in the region, with 16,000 employees. Fort Meade comes in a close second with over 14,000 employees. A best guess puts the total employment of all seven facilities well above 70,000.[63]

While the federal government offers many employment opportunities in the area, Baltimore maintain a diversified economy. When looking at location quotients (LQs) there are several other industries with a high concentration of activity as can be seen in Table 10 below. LQs are an important tool because they measure the degree of concentration of an industry's employment within a region relative to the nation. An LQ greater than one indicates that the Baltimore MSA has a higher concentration of industry presence while an LQ less than one indicates that the Baltimore MSA has a lower industry presence relative to the national average. For instance, the Baltimore MSA's LQ of 1.72 for education indicates that Baltimore is net-exporting, rather than net-importing, education. That is, people from outside the Baltimore MSA are buying the region's education services.

[62] Economic Alliance of Greater Baltimore, "Biosciences in Greater Baltimore", June 2007, p. 26.

[63] According to the Economic Development Report by the Economic Alliance of Greater Baltimore, these numbers are rough estimates due to the fact that some agencies, particularly those involving security and intelligence gathering, do not report full figures or any figures at all. Of the seven agencies located within the region, four are related to military, security or intelligence, resulting in unsubstantiated estimations of employees.

Table 10: Baltimore Industries Ranked by Location Quotient

Rank	Top Industries	Location Quotient
1	Education	1.72
2	Federal Government	1.57
3	Professional, Scientific & Technical Services	1.44
4	State Government	1.44
5	Finance -Security & Communication	1.23
6	Health Care	1.18

Source: Economic Alliance of Greater Baltimore, 2007.

According to the Economic Alliance of Greater Baltimore, the Baltimore MSA ranks 6th among the 25 largest metropolitan areas for its concentration of Professional, Scientific and Technical Services employment. Washington, D.C.'s concentration (2.72) dwarfs every other comparable metropolitan area, while the metropolitan areas of San Francisco-Oakland (1.74), Boston (1.59), San Diego (1.57), and Detroit (1.53) round out the top 5. Between 2000 and 2006, the Greater Baltimore region's Professional, Scientific and Technical Services employment grew 19.4 percent. Though both the Washington, D.C. and San Diego MSA's grew slightly more during the same time period, at 23.7 and 19.6 percent, respectively, San Francisco-Oakland, Boston and Detroit all had significantly less aggressive growth.

The Baltimore MSA has a marvelously high-tech, highly educated industry base already established. This foundation creates an environment for a diverse and strong economy to grow, which is evident from the number of divergent occupations with strong LQs and the high wages these occupations command. In the Economic Development Progress Report compiled by the Economic Alliance of Greater Baltimore, they note ten occupations with LQs greater than 1.0 for the Baltimore MSA. Based on these LQ figures, three top sectors within the Baltimore MSA are Computer & Mathematical Science, Legal, and Life, Physical and Social Sciences. These occupations also fare well when comparing annual wages. According to the Economic Development Progress Report, in a list of some of the region's highest earning occupations, Legal leads with an annual wage of $85,470 in 2006, followed by Computer & Math Science ($75,660) and, down slightly farther, Life, Physical & Social Sciences ($60,890). The top ten highest earning occupations in Baltimore ranged from annual earnings of $41,100 to $97,150. Finally, the Economic Development Progress Report notes that Computer & Math Science and Life, Physical and Social Sciences have experienced exceptional growth between 2000 and 2006, growing 40.5 and 21.2 percent, respectively.[64]

Another ingredient that characterizes successful innovation centers such as RTP and Silicon Valley today is a vibrant quality of life. Baltimore exhibits strength in this area along many dimensions. For instance, Forbes ranked the metropolitan area of Washington-Baltimore the ninth best region for singles in 2006[65] and a 2007 American

[64] Economic Alliance of Greater Baltimore, p. 19.
[65] Id, p. 23.

Style Magazine reader poll listed the Baltimore MSA as the twelfth most popular art destination among areas with a population of at least 500,000[66]. Baltimore also has a strong downtown, ranking eighth by population found in a one-mile radius surrounding the city center.[67] A vibrant and charming coastal city, Baltimore offers many location benefits to people who opt to relocate there.

Of course, as with any urban center, Baltimore is not without its problems. Although only 6.1 percent of families in the region had incomes below the official poverty level in 2006 (the national average was 9.8 percent), the area experienced a high level of violent crime. That year, 2006, there were 823.8 violent crimes per population of 100,000 in the Baltimore MSA, compared to a national average of 473.5. However, from 2004-2006 the Baltimore MSA realized a 3.5 percent decline in its violent crime, while the national average actually climbed 0.9 percent.

Another dimension of quality of life is average commute time. Commuters in the Baltimore region averaged a 28.9 minute trip to work in 2006, which exceeded by 4-5 minutes the national average and averages found in the Austin, San Jose, and San Francisco regions, and by one minute the average Boston worker's commute.[68] In its 2007 Urban Mobility Report[69], the Texas Transportation Institute found that the Baltimore region had higher than average delay per traveler, higher travel time than average, and much higher total delay than average among urban areas with populations between 1 and 3 million. The study also found that the Baltimore region experienced growth in total delay at a much faster rate than average between 1982 and 2005.

Arguably the one of the more critical measures of quality of life for a region is its cost of living. In this measure, Baltimore proves to be a relatively inexpensive area to live within the Northeast Corridor. According to the Greater Baltimore Council, the Baltimore MSA scored 117.6 on the ACCRA Cost of Living Index in 2007 (above 100 indicates a region is costlier than the national average).[70] Table 11 compares Baltimore with a few other places, including Raleigh and Boston, two of our case study regions; Austin, Texas (home of the "Silicon Hills"), another national technology center; and Washington, a more local area also home to a technology cluster. Though the cost of living in Baltimore is higher than the national average and the average costs found in Raleigh, it seems relatively inexpensive compared with other Northeastern Corridor cities. We view this as an advantage for Baltimore, since Washington, D.C. is about 40 miles south of the City and New York City around 185 miles northeast. Taken together, we view the Baltimore MSA's quality of life and cost of living to be unique strengths and common weaknesses.

[66] Greater Baltimore Committee, p. 53.
[67] Economic Alliance of Greater Baltimore, p. 23.
[68] American Community Survey, 2006
[69] Texas Transportation Institute http://mobility.tamu.edu/ums/congestion_data/tables/baltimore.pdf.
[70],Greater Baltimore Committee, p. 50.

Table 11: ACCRA Cost of Living Index for Selected Regions (U.S. Average = 100)

Metropolitan Area	100% Composite Index, 2007
Austin	95.1
Raleigh	100.4
Baltimore	117.6
Boston	135.9
Washington, DC	140.6

Source: The Greater Baltimore Council

Similar to the Baltimore MSA's cost of living, the State of Maryland's cost of doing business fares quite well when compared to states in the Northeast Corridor. The Milken Institute's 2007 Cost-of-Doing Business Index ranked Maryland as the 11th most expensive state, about 6.5 percent above the national average. Table 12 shows how Maryland compares to the home-states of Boston, Silicon Valley, and RTP, along with states throughout the Northeast Corridor and Texas, home of the "Silicon Hills" in Austin. In the Northeast Corridor Maryland is the state with the lowest cost of doing business. The State many opportunities the State offers because of its location along the Northeast Corridor compensate for its relatively high national premiums. Forbes also ranked the Baltimore MSA as the 51st "Best Metro for Business" out of the 200 largest 200 metropolitan areas in the country.[71]

Table 12: 2007 Cost-of-Doing Business Index (100 = U.S. average)

Rank (1 = Most Expensive)	State	Cost of Doing Business Index
2	New York	130.9
4	Massachusetts	130.6
5	Connecticut	127.5
6	California	122.9
7	New Jersey	120.9
9	Delaware	110.1
10	Rhode Island	108.0
11	Maryland	106.4
24	Texas	95.9
31	North Carolina	90.8

Source: Milken Institute, Cost-of-Doing Business Index, 2007.

[71] Badenhausen, Karl. "Special Report: Best Places for Businesses and Careers". Forbes Magazine. April 5, 2007.

While each region has its own inherent weaknesses, those in the Baltimore MSA can be corrected over time. These weaknesses include venture capital investment, commercialization abilities, and exposure to competition. The entire process of completing a finished biotechnology[72] product often costs between $100 and $400 million, and without venture capital most great ideas would fail to receive the funding necessary for commercialization.[73] From 2002 through 2006 the Washington-Baltimore metropolitan region was 4th in the country in venture capital deals in biotechnology and 6th in venture capital investment in biotechnology. In both cases the region lagged far behind Boston and Silicon Valley (see Tables 13 and 14).

Table 13: Number of Venture Capital Deals in Biotechnology (2002-2006)

Rank	**Market**	**# of Deals**
1	San Francisco/Silicon Valley	376
2	Boston/New England	293
3	San Diego Metro	202
4	***Washington/Baltimore Metro***	***144***
5	Philadelphia Metro	141
	Total U.S.	*1,789*

Source: Economic Alliance of Greater Baltimore, 2007.

Table 14: Venture Capital Investment in Biotechnology (2002-2006)

Rank	**Market**	**$ Invested (in billions)**
1	San Francisco/Silicon Valley	5.104
2	Boston/New England	3.630
3	San Diego Metro	2.457
4	New York Metro	1.900
5	Philadelphia Metro	1.590
6	***Washington/Baltimore Metro***	***0.991***
	Total U.S.	*19,484.670*

Source: Economic Alliance of Greater Baltimore, 2007.

[72] It is important for a region to embrace its strengths, and with two new bioparks and the assets outlined throughout this report we feel that the Baltimore MSA's primary high-tech advancements will occur in bioscience and biotechnology. Therefore, when we compare the Baltimore MSA here we focus on venture capital investment in biotechnology, because we consider that the region's most important high-tech sector.

[73] Economic Alliance of Greater Baltimore, "Biosciences", p. 24.

The Washington-Baltimore region does lead the country in growth in biotechnology venture capital investment and number of biotechnology deals (see Tables 15 and 16. This is a positive sign that the region continues to progress, but it still has a tremendous gap in venture capital resources. Firms or startups that locate in the area can capitalize on its mounting importance in the biotechnology industry, but at this point they may still have an easier time raising funds in. It is essential that the region continues to expand its venture capital resources. A lack of venture capital availability would force researchers and firms to take their ideas and products to other markets.

Table 15: Growth in Number of Biotechnology Deals in Large Markets (2002-2006 vs. 1997-2001)

Rank	**Market**	**% Deal Growth**
1	***Washington/Baltimore Metro***	***121.5***
2	San Francisco/Silicon Valley	37.7
3	Washington State	29.4
4	Boston/New England	16.7
5	Philadelphia Metro	15.6
	U.S. Average	*21.5*

Source: Economic Alliance of Greater Baltimore, 2007.

Table 16: Biotechnology Venture Capital Investment Growth in Large Markets (2002-2006 vs. 1997-2001)

Market	**% Investment Growth**
Washington/Baltimore Metro	***134.3***
Boston/New England	90.0
New York Metro	72.1
Philadelphia Metro	68.9
San Francisco/Silicon Valley	56.1
U.S. Average	*51.6*

Source: Economic Alliance of Greater Baltimore, 2007.

A second weakness for the Baltimore MSA is its inability, thus far, to transfer research and technology ideas from academia to the market. For instance, the Milken Institute lists Johns Hopkins University (JHU) seventh in its worldwide "University Biotechnology Publication Ranking", using data from 1998-2002; in its "Biotech Patents Rankings", the Institute list JHU third based on 2000-2004 data; however, JHU does not even appear in the Institute's "University Technology Transfer and Commercialization Index". On the other hand, the Massachusetts Institute of Technology (ranked 1st), Stanford University (ranked 4th), Harvard University (ranked 18th), the University of California, San Francisco (ranked 19th), North Carolina State University (ranked 20th), and the University of North Carolina, Chapel Hill (ranked 25th), all appear on the commercialization list, along with the University of California System (ranked 2nd), which most likely includes Berkeley.[74] JHU also scores highly on AUTM's rankings for "Research Expenditure Total, 2000-2004" (2nd), "Invention Disclosures, 2000-2004" (4th), "Patents Filed, 2000-2004" (2nd), "Patents Filed Per Invention Disclosure, 2000-

[74] Devol et al, "Mind to Market", p. 10, 11, 14

2004" (5th), "Patents Issued, 2000-2004" (5th), and "Licenses Executed, 2000-2004" (6th). However, JHU places outside the top ten in all the rankings that deal with income generated from licenses and startups formed.[75] Until commercialization becomes more prevalent in the Baltimore MSA's academic institutions, this remains one of Baltimore's main disadvantages.

We also consider the steep competition that exists for acquiring research funds and venture capital investment as well as attracting major firms a weakness of the Baltimore MSA compared with the case studies. We discuss this more in the next section.

5.4.2 How Does Baltimore Stack Up to Other Clusters?

Having discussed the relative strengths and weaknesses, what ingredients are missing from the Baltimore MSA that our case studies took advantage of? Building off a weakness from Section 5.4.1, one thing that the Baltimore MSA and the State should build is greater cohesion between academia and the private sector. An almost preternatural culture of entrepreneurialism exists in the universities of the San Francisco Bay Area and Silicon Valley. However, that would be nearly impossible to replicate. On the other hand, something like the Research Triangle Institute (see Section 5.1), would be easier to create and could prove to be quite useful in stimulating faculty involvement in Baltimore's bioscience and biotechnology development and general "brain magnetism". A main lure of the new bioparks for entrepreneurs and corporations is the opportunity to communicate and collaborate with professors. However, if it becomes clear that faculty members lack interest in cooperating, businesses will lose interest in the bioparks. If the Baltimore MSA is to develop into a true center for our knowledge-based economy it requires that its research universities join other elite research universities, such as those in our case studies, as premier developers and conveyers of new ideas, technology and products.

Also present at RTP, but missing in the Baltimore MSA, is an actual charter that explicitly spells out the Park's purposes. As discussed earlier, RTP was founded with the goals of promoting North Carolina's research facilities and promoting cooperation among the universities and other regional research establishments for the betterment of the state's economy. Although Silicon Valley and Boston's Route 128 emerged organically, such a mission statement might help encourage collaboration between academia and the rest of the region's research bodies.

Further compounding the difficulties facing Baltimore MSA, is the fact that many areas across the nation are striving to be the next RTP. This competition puts the Baltimore MSA at a disadvantage when it comes to venture capital as well as federal funding. While each of the three clusters studied surged ahead, they faced little competition and built there successes over decades. The Baltimore MSA compared to these regions is just beginning and faces an uphill battle in getting a piece of the pie. This is not to say that the Baltimore MSA can not succeed and overcome these challenges. Over the last several years the Baltimore MSA has performed well in growth and high tech development when compared to the three cluster studies.

[75] Id., p. 103, 105-7, 109-113.

In the Milken Institute's "2007 Best Performing Cities" list, which ranks[76] the largest 200 metropolitan areas in the country based on recent growth in their overall economy and high-tech sectors, Baltimore's best scores came in "5-year relative high-tech GDP growth" and "number of high-tech GDP LQs over 1". Table 17 compares Baltimore's ranking in these categories and its overall ranking with previously discussed metropolitan areas. The Baltimore MSA lags behind the other regions in high-tech GDP LQs over 1, which measures the concentration of high-tech firms and their output in the regional economy. This returns us to the region's relative youth, since it has not been building up its high-tech industries over the past several decades like the other metropolitan areas. However, the Baltimore MSA led them all in 5-year relative high-tech GDP growth over the period 2001-2006, demonstrating Baltimore MSA's advancement in the modern knowledge-based economy.

Table 17: Selected Values and Rankings for Selected Metropolitan Statistical Areas

Metropolitan Statistical Area	**5-yr Relative High-Tech GDP Growth (Rank)**	**# of High-Tech GDP LQs Over 1**	**Overall Index (2007 Rank)**
Austin-Round Rock	105.01 (62)	1.75 (12)	222.71 (20)
Durham	89.34 (153)	10 (28)	379.94 (74)
Baltimore-Towson	***111.22 (39)***	***9 (36)***	***420.20 (94)***
San Jose-Sunnyvale-Santa Clara	76.66 (188)	17 (2)	449.05 (107)
Cambridge-Newton-Framingham	90.63 (148)	17 (2)	621.09 (142)

Source: Milken Institute, 2007 Best Performing Cities - Largest 200 Cities List

These indicators demonstrate that the Baltimore MSA is making advances toward gaining a piece of the technology pie. Furthermore, Baltimore MSA has one distinct advantage that none of the three clusters had during there infancy years, and that is nearness to Washington, D.C. A close proximity to D.C. is seen by many businesses as a perk. Closeness to government agencies and laboratories is seen as an advantage in collaboration. Through this collaboration or proximity also comes access to more government funding, or at least the possibility of better odds. As an attest to this the corridor (I95) between Baltimore City and Washington, D.C. has immensely expanded over the years and resulted in a merging of the two regions to create its own combined statistical powerhouse area. If Baltimore MSA can continue to capitalize on its nearness to D.C., then the region is poised to hold strong and become a "brain magnet".

[76] A low index score indicates positive performance.

5.4.3 Conclusion

The Baltimore MSA, with assistance from federal, state and local governments, venture capitalists, private sector companies and academic institutions, has made great strides towards evolving into a premier "brain magnet". We stress *evolving* because this process will require years, even decades, to complete. Our case studies demonstrate that it takes time to develop into a national and global leader.

The ability to provide a foundation for companies of varying sizes and ages has clearly impacted the success of these regions and allowed them to adapt to changing economic environments. These regions also support companies from diverse sectors and industries. Additionally, the three focus regions also offer an abundance of employment opportunities for highly skilled workers. RTP, Silicon Valley, and the Boston Metropolitan Area all demonstrate that a concentration of similar and complementary entities, involving academia, government, and the private sector, can generate significant regional economic impacts. Each region has become an innovation leader, characterized by a dynamic economy and above average wages.

In comparison to these clusters, we have shown that the Baltimore MSA currently has the intellectual capital base to compete with the rest of country. With the opening of life sciences research parks at the University of Maryland, Baltimore (UMB) and Johns Hopkins University (JHU), which will complement bwtech@UMBC, the Baltimore MSA's infrastructure will soon also compete nationally (see Section 4 for more information). TEDCO and DBED, much like the North Carolina Biotechnology Center, continue to encourage entrepreneurs by providing much needed assistance to the State's small businesses and startups. The Washington-Baltimore region is far behind the Boston region and the Silicon Valley region in terms of raw dollars of venture capital invested in biotechnology projects, but from 2002-2006 it has experienced the country's fastest growth in biotechnology venture capital investment. Although we view this growth rate as a significant indicator of the Baltimore MSA's *evolution*, the raw totals inform us that the region has a significant disadvantage in timing.

RTP was the first establishment of its kind and thus faced limited competition, while Silicon Valley and Boston both received tremendous resources due to their unique networks of research universities and the federal government's generous scientific research expenditures following World War II and throughout the Cold War. These clusters have had about 50 or 60 years to foment innovation and solidify their place among the top "brain magnets" in the world. Unfortunately, at this point the Baltimore MSA faces competition and lacks a federal government pouring funds into scientific research at an historic rate.

However, what Baltimore and the State might actually be able to take advantage of is the looming recession. Following the recession of the early 1990s, Boston found that many corporations slashed their research and development operations and instead relied more heavily on the Route 128 universities to pick up the slack.[77] If the U.S. economy does

[77] Appleseed, p. 43.

enter a recession or prolonged deceleration, biotechnology companies might reduce their R&D operations as research firms did roughly 15 years ago. In that case, Baltimore, with its research universities and new bioparks, would be an ideal location for companies to fulfill their R&D requirements. This of course, would require the research universities and private sector firms to forge a new, cohesive relationship.

One thing that Baltimore and the State must build is greater cohesion between academia and the private sector. An almost preternatural culture of entrepreneurialism exists in the universities of the San Francisco Bay Area and Silicon Valley. However, that would be nearly impossible to replicate. On the other hand, something like the Research Triangle Institute, which was founded as a way to continue engaging faculty members in Research Triangle Park's overall purpose, would be easier to create and could prove to be quite useful in stimulating faculty involvement in the Baltimore MSA's further development. It is also worth considering the creation of an official mission statement along the lines of what the RTP Foundation came up with. Many pieces are in place for the Baltimore MSA to evolve into a beacon in our new knowledge economy. All it requires now are the few remaining ingredients.

6.0 References

Appleseed Inc. "Engines of Economic Growth: The Economic Impact of Boston's Eight Research Universities on the Metropolitan Boston Area". 2003.

Bay Area Economic Forum. "Technology Start-Ups and the Dynamics of Silicon Valley". Winter 2005.

Bay Area Science and Innovation Consortium. "The Bay Area's Research Institutions." March 1999.

Berberick, Steve. "Bioparks Lure: Universities and Low-Interest State Loans". Gazette. November 16, 2007.

Bureau of Economic Analysis. http://www.bea.gov/bea/regional/rims/brfdesc.cfm

Carlson, William. "With Bioparks on the Way, State, City Leaders Can't Rest on Their Laurels". Baltimore Business Journal. February 4, 2005.

Carson, Kelly. "University of Maryland, Baltimore, Reshapes City's Economic Status, Intellectual Landscape". The Examiner. January 23, 2007.

Casper, Steven. "Café Biotech: Computing the Social Science Reveals the Dynamics Behind Biotechnology Clusters". Biotech 360. 2007.

CB Richard Ellis. "Marketview Baltimore Office". Fourth Quarter 2007. www.cbre.com.

Council for Entrepreneurial Development. http://www.cednc.org/about/.

DeVol, Ross, Frank Fogelbach. "Best Performing Cities: Where Americas Jobs Are Created". Milken Institute. June 2003.

DeVol, Ross, Armen Bedroussian, Anna Babayan, Meggy Frye, Daniela Murphy, Tomas J. Philipson, Lorna Wallace, Perry Wong and Benjamin Yeo. "Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization." Milken Institute. September 20, 2006.

Duke University Office of Public Affairs. "Durham and Duke: An Analysis of Duke University's Estimated Total Annual Economic Impact on the City and County of Durham". 2005.

Economic Alliance of Greater Baltimore. "Biosciences in Greater Baltimore". June 2007.

Economic Alliance of Greater Baltimore. "Economic Development Progress Report for Greater Baltimore 2000-2007". November 2007.

Econsult Corporation. "The University of Pennsylvania: Economic and Fiscal Impact Report". April 2006.

Elstrom, Peter et al. "It Must Be Something in the Water." BusinessWeek. August 25th, 1997.

Entrepreneurial Development and Assistance Center. http://www.edacmorgan.com/index.php.

Evans, Julie. "UMB Biopark Flourishes". UMD Research & Scholarship. 2007.

Forest City Science + Technology Group. http://www.forestcityscience.net/hopkins/region_statistics.shtml

Fuechtmann, Thomas G. et al. "Higher Education in the Loop and South Loop: An Impact Study". January 2005.

Fuller, Stephen S. "The Economic Impact of George Washington University on the Washington Metropolitan Area". July 2000.

Greater Baltimore Committee. "Baltimore State of the Region Report". 2007.

Hughes, Jim. "Industry, Universities Need to Collaborate to Grow Bioscience Base". Baltimore Business Journal. July 20, 2007.

Institute for Strategy and Competitiveness. http://www.isc.hbs.edu/econ-clusters.htm

Invoke Systems. http://www.invokesystems.com/about/

Jacob France Institute. Economic Impact Study on Baltimore Collegetown Network. 2007.

Jarboe, Kathleen Johnston. "Square Feet: Bioparks Bring Golden Opportunity to Universities, Life Science Firms". The Daily Record. October 5, 2007.

Mackun, Paul. "Silicon Valley and Route 128: Two Faces of the American Technopolis." http://www.netvalley.com/archives/mirrors/sv&128.html.

Maness, Reid. "Research Triangle Park Today." http://www.aaas.org/spp/rcp/biloxi/rtp_today.html.

Maryland Advisory Commission on Manufacturing Competitiveness. "Maryland Manufacturing: The Status, The Challenges, The Recommendations." December 2002.

Maryland Office of Tourism Development. "The Economic Impact of Travel on Maryland Counties 2005." Research Department of the Travel Industry Association. November 2006.

Maryland Port Administration. "The Economic Impacts of the Port of Baltimore." Martin Associates. November 10, 2003.

Maryland Venture Fund. http://www.choosemaryland.org/businessservices/marylandventurefund/mvf.html

Morgan State University. "Title III Programs." http://www.morgan.edu/admin/TitleIII/title3.asp.

National Health Institute. "NIH Awards to All Institutions by Rank". 2003.

North Carolina Biotechnology Center. http://www.ncbiotech.org/about_us/index.html.

North Carolina Biotechnology Center. "Frequently Asked Questions." http://www.ncbiotech.org/about_us/faq/index.html#xxx12.

Office of Governor – Press Release. "Governor O'Malley Applauds Creation of the Maryland Life Sciences Advisory Board." April 3, 2007.

The Research Triangle Foundation of North Carolina. "Research Triangle Park: Evolution and Renaissance". June 2006.

The Research Triangle Foundation of North Carolina: "RTP Overview Fact Sheet". 2007.

RWD Technologies. http://www.rwd.com/about_us/

Schutlz, Sue. "City's Emerging Bioparks Lining Up Tenants for Newest Research Space". Baltimore Business Journal. April 27, 2007.

Science & Technology Park at Johns Hopkins. http://www.forestcityscience.net/hopkins/

Sedway Group. "Building the Bay Area's Future: A Study of the Economic Impact of the University of California, Berkeley". 2001.

Stern, Seth. "Why Boston Covets its Role as Biotech Hub." The Christian Science Monitor. December 26, 2003.

TEDCO Annual Report. Maryland Technology Development Corporation. September 30, 2005.

Texas Transportation Institute. "2007 Annual Mobility Report". 2007. http://mobility.tamu.edu/ums/congestion_data/tables/baltimore.pdf

UMB Biopark Breaks Ground. January 9, 2004. http://www.oea.umaryland.edu/communications/news?ViewStatus=FullArticle&articleDetail=157

University of Baltimore. http://www.ubalt.edu/template.cfm?page=1884

Webster's II New Riverside University Dictionary. The Riverside Publishing Company. 1988.

Zhang, Junfu. "High-Tech Start-Ups and Industry Dynamics in Silicon Valley". 2003.